DEVELOPMENT OF RESOURCES AND OF ECONOMIC OPPORTUNITY IN THE PACIFIC NORTHWEST

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OCTOBER 1942

NATIONAL RESOURCES PLANNING BOARD

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DEVELOPMENT OF RESOURCES AND OF ECONOMIC OPPORTUNITY IN THE PACIFIC NORTHWEST

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REPORT OF THE

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION

TO THE

NATIONAL RESOURCES PLANNING BOARD

UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON : 1942

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EXECUTIVE OFFICE OF THE PRESIDENT
NATIONAL RESOURCES PLANNING BOARD
WASHINGTON, D. C.

OCTOBER 29, 1942

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT:

We have the honor to transmit herewith a report of the Pacific Northwest Regional Planning Commission to the National Resources Planning Board on "Development of Resources and of Economic Opportunity in the Pacific Northwest."

The war program is making increasing use of the rich resources of this region and speeding the process of its development through the construction of new industries and the migration of war workers to augment its comparatively small population. At the end of the war the resources of the area will present many opportunities for converting its new factories, facilities, and skills to peacetime economic development.

Since 1934, the Pacific Northwest Regional Planning Commission has been working to bring about the planned development of the region and the integration of the individual plans and programs of the many agencies and groups concerned with resource use. In 1938, at your direction, we requested the Commission to undertake the preparation of plans for public works for the region beginning with a study of land and migration problems.

The series of studies undertaken and embodied in this report are:

Part I. The Region
Part II. Agricultural Land Development
Part III. Industrial Development
Part IV. A Plan and Program for Regional Development and Internal Improvement

Foresight during the previous decade in developing power resources of the Columbia Basin through construction of the Bonneville and Grand Coulee facilities and their linkage in a regional grid greatly increased the contribution made by the region to the war effort. The plans presented in this document will aid that contribution and indicate the opportunities for post-war development of the Pacific Northwest.

Sincerely yours,

FREDERIC A. DELANO, *Chairman.*
CHARLES E. MERRIAM.
GEORGE F. YANTIS.

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[1] Vice Walter C. Clark, 1941.

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Acknowledgment is made herewith to the following agencies for use of photos in various figures:

FIGURE 1: The Farm Security Administration; the Bureau of Reclamation, U. S. Department of the Interior

FIGURE 33: Oregon Historical Society; Fish and Wildlife Service, U. S. Department of the Interior, U. S. Forest Service

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PART I
THE REGION

SUMMARY OF BACKGROUND REPORT

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Advisory Committee for Study: Land Advisory Committee—W. H. Horning (Interior Department), Colonel John C. H. Lee (Corps of Engineers), H. E. Selby (Department of Agriculture), *Steering Committee;* E. H. Aicher, F. L. Ballard, F. E. Balmer, F. A. Banks, F. H. Brundage, L. L. Bryan, J. H. Christ, Earl B. Day, Merle L. Drake, W. A. Duffy, A. E. Edwards, R. S. Erb, C. E. Greider, Thomas Horsford, E. J. Iddings, E. C. Johnson, Clyde McKee, Orlo H. Maughan, H. A. Parker, A. D. Ryan, W. A. Schoenfeld, John Shepherd, E. T. Taylor, J. C. Taylor, O. C. Upchurch, *members;* George F. Yantis (Chairman, pro tem), R. F. Bessey (Consultant), Sinclair A. Wilson (Chairman, Land Resources Division, PNWRPC). Population Subcommittee—W. A. Duffy, R. S. Erb, Charles F. Ernst, Elmer Goudy, S. D. Hays, Thomas Horsford, T. S. Kerr, P. A. Parsons, R. R. Renne, Calvin Schmid, L. C. Stoll, Paul Taylor, Nathan Whetten, *members.*

Summary prepared by Virginia Fox Hartley of NRPB staff.

NATIONAL RESOURCES PLANNING BOARD

PART I
INTRODUCTION

Among all the regions of the United States, none is more closely knit together by physiographic, economic, and cultural ties than the Pacific Northwest. It is a region of great natural wealth and a relatively small population. During the last decade, however, changing economic conditions, both inside and outside the region, gave rise to serious problems of resource use and population adjustment in the Pacific Northwest.

Since the early days of the fur trade, the economic life of the region has been based on the export of raw materials—minerals, lumber, and agricultural products, in particular. Because the raw materials suitable for export were plentiful and the market for them constantly growing, the people of the region have enjoyed a comparatively high standard of living.

Certain shifts, however, have been taking place that were bound to alter this regional economy. Within the region the period of rapid growth in agriculture and lumbering was approaching an end. At the same time market expansion outside the region was slowing down. The depression of the thirties sharply curtailed the demand for the raw materials of the Pacific Northwest both in this country and abroad; and the subsequent growth of artificial barriers to foreign trade—tariffs, exchange controls, and other similar devices—resulted in still further destruction of markets.

In an effort to stimulate economic activity, the Federal Government in 1933 undertook the construction of two huge projects—Grand Coulee and Bonneville—to utilize the vast water power of the Columbia River, and, in the case of Grand Coulee, to reclaim over a million acres of cultivable land in the Columbia River basin. In 1934 drought struck the Great Plains, and people from this section of the country and from other depressed areas poured into the Pacific Northwest, where life appeared to be less rigorous and where there seemed to be fewer people with whom to compete for land and jobs.

To absorb the new migrants, readjustments in the economy of the Pacific Northwest were required. Industries had to be developed and agriculture expanded to provide additional employment in factories and on farms and to utilize the large quantities of electric power being made available.

At the end of the decade, war abroad and then the defense program here brought still other influences to bear on the regional economy. There was a marked increase in industrial activity in the region; and the immediate problem became one, first, of meeting defense needs quickly and efficiently; second, of adjusting defense activities, so far as possible, to existing patterns of regional development; and third, of so planning for future development as to provide for the inevitable readjustment in the regional economy that would have to be made when the emergency was over.

Since 1934, the Pacific Northwest Regional Planning Commission has been working to bring about the planned development of the region and the integration of the individual plans and programs of the many agencies and groups concerned with resource use. The Commission has made studies of possible future development in the region and of the desirable regional organization for planning, construction, and operation of public works; of the region's balance of trade, in order to throw light on its essential economic position; of its forest resources, on which the region is, economically, so dependent; and of other regional problems.[1]

In 1938, at the direction of the President, the National Resources Planning Board (then the National Resources Committee) requested the Commission to undertake a study of land and migration problems in the region. Funds for the study were allotted by the Public Works Administration with the request that there be included in the survey recommendations "with regard to fundamental land and water programs and projects of the various Federal and State agencies leading to the construction of public works recommended as a result of these studies."

The series of studies undertaken is embodied in this report. Part I consists of a summary of the preliminary "background" study.[2] Part II, a survey of potential land development, includes a region-wide inventory, carried out as a joint project with the Bureau of Agricultural Economics, of land suitable for reclamation or more intensive use through irrigation, drainage, diking, and clearing, together with a general appraisal of the feasibility of such development. Part III analyzes present and potential industrial development in the region, and in Part IV, an attempt is made to focus the earlier studies in a first draft of a plan and program of internal improvements for the region.

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[1] See Pacific Northwest Regional Planning Commission, *Regional Planning, Part I—Pacific Northwest*, 1935–36; *Balance of Trade of the Pacific Northwest*, 1937; *The External Trade of the Pacific Northwest*, 1942; and *Pacific Northwest Forest Resources*, 1938.

[2] *Migration and the Development of Economic Opportunity in the Pacific Northwest*, mimeo, 1939. The summary presented here is in large part taken from an earlier summary, *Men and Resources*, published by the Northwest Regional Council. Figures cited have, however, been brought up to date wherever this was feasible, and some recognition has been given to the effects of the defense activities on regional development.

PART I

1. POPULATION

The resources of the Pacific Northwest are ample to provide for a much larger population than they now support. In fact, a growing population in the Pacific Northwest is to be desired. Economic development in the region has been impeded by reason of the low ratio of people to resources. If newcomers can be properly assimilated into the regional economy, their energy and skill will add to the productive capacity of the region, and their needs will result in a larger market for regional products.

Population Prospects

The population forecasts for the Pacific Northwest indicate that any substantial population growth must come mainly through migration from other sections of the country. The birth rate in the Pacific Northwest has been consistently low. More than half of the region's total population has always been made up of people born elsewhere.

At birth and death rates prevailing in the "thirties," and without any interstate migration, Oregon and Washington might expect to have a declining population after 1950. The birth rate for Idaho and Montana, however, is sufficiently high to maintain a slight natural growth for the region as a whole until about 1970, though at a rate considerably below that for the Nation. In the cities of the region the rate of natural increase is not sufficient to maintain the present populations.

Furthermore, the population of the region will be growing older—that is, there will be more old people and fewer children in the Pacific Northwest—as it approaches a stable or declining population. For example, the proportion of people 65 years old or more in Oregon and Washington in 1970 will be about twice what it was in 1930. This means that an increase in the number of deaths may be expected, as well as a decreasing number of births. In short, it is estimated that without any gain through migration the region will have a population of less than 4 million by 1970 as against, roughly 3.5 million in 1930.

It is reasonable to expect, however, that migration into the region will continue. Certain parts of the United States, notably in the South and the Great Plains, contain more people than their resources can support. A stable farm economy in the Dust Bowl calls for a change in land use and in farm practices that will result in fewer farms and fewer people on the farms. Soil depletion and the use of farm machinery in other areas may be expected to create a large group of dispossessed farmers and unemployed farm laborers.

It is only natural that the Pacific Northwest should draw to it many of those whom drought, new agricultural programs and practices, population pressures, and depressed local conditions force to migrate. In the Pacific Northwest the population is small and the standard of living comparatively high. The climate and natural setting are pleasant. Friends and relatives of those still living in less-favored areas have already settled in the Pacific Northwest, and there are large development projects, such as Grand Coulee, of a type to attract migrants.

How many people will come and from what sections of the country they will come it is difficult to forecast. The opportunities offered in the Pacific Northwest are not apt to be the controlling factor. Most of the people who have come in recent years have been forced to migrate by circumstances at home, and economic conditions in other parts of the country will probably continue to determine to a great extent the size and origin of future migrations to the region.

The Recent Migration

It is estimated that more than 400,000 people entered the Pacific Northwest between 1930 and 1939. Approximately one-half this number remained to establish residence somewhere within the region, giving the region a net population gain from migration of, roughly, 200,000 between 1930 and 1940. A large part of this migration took place in the years 1935–38, when refugees from the drought were added to the usual flow of people moving westward, of people entering the region from neighboring States, and of migratory farm laborers. Of these 400,000 migrants, about half were from the Great Plains States, the greatest number coming from the Northern Great Plains.

Today's migrants, unlike the early settlers, are faced with the problem of finding or making a place for themselves in a going economy. Great numbers of the recent migrants arrived in the region with insufficient funds to support them while they looked for work. Those who settled in the rural areas needed land to farm; those who went to the cities needed jobs; and neither was to be had for the asking. The result was that living conditions among the migrants were all too frequently far below standard.

Farmers

A large number of the rural migrants, particularly those from the Great Plains, were at the end of their financial rope when they crowded their families and what remained of their possessions into a dilapidated car and set forth for the Pacific Northwest. People who migrate under these circumstances naturally gravitate toward those areas where they can obtain land at the least possible cost. They settle on poor land or unimproved land that they would not occupy if they could afford better. Moreover, lack of knowledge of the region often made the migrant's judgment of land values and of productive capacity bad, and lands were farmed that could not possibly produce enough for a decent family living.

The indications are that half or more of the recent rural settlement occurred in areas where land-use problems are acute. Land-use problem areas both east and west of the Cascades received large numbers of settlers, and the intermountain valleys of northern Idaho and western Montana received many more people than can be permanently supported on the land at a good standard of living. Furthermore, many of the farm migrants were able to acquire only a few acres of land, so that outside employment was essential if they were adequately to support their families.

Farm Labor

The fact that there is a large demand for farm labor in the Pacific Northwest probably had a good deal to do with drawing the farm migrant to this region in search of work. Since he often had no capital or equipment left, he was forced to start over again as a farm laborer.

The intensive agriculture of the Pacific Northwest—the raising of fruit, vegetables, and hops—requires large amounts of hand labor, particularly during the harvesting seasons. There are many resident farm laborers and a large group of migratory workers who move from one locality to another, as the crops are ready for planting and harvesting.

These farm laborers, both resident and migratory, are employed only about 6 months out of every year. During this period, they must save enough to keep them the other 6 months or be dependent upon relief; and while the region's farm population as a whole enjoys a relatively high standard of living, this is not true of farm laborers.

Wages are low, and the annual income of both the resident and the migratory worker is seldom large enough to permit him to save anything on which to live during the months he is unemployed. Yet the mobility of the migratory worker makes it difficult for the relief authorities to do much for him, and this mobility also stands in the way of anything like regular schooling for his children.

Problem of Absorption

There is much that has been done or could be done to improve conditions among migrants. There are various kinds of government aid available to those who wish to obtain land to farm. If settlers will be guided by the field service of the Department of Agriculture—the Farm Security Administration and the Agricultural Extension Service, in particular—in selecting land for farming and in adopting suitable farm management practices, many failures will be avoided.

The Farm Security Administration's program of providing camps for migratory farm workers will improve living conditions for this group. A more rigorous enforcement of State and local sanitation requirements and some provision to make medical care available to the low-income farm groups would reduce the number of epidemics and raise the health level among these people. Through the State Employment Service, better coordination between the demand for agricultural labor and the supply of available workers in any given locality at any given time may be achieved. If the Social Security Act could be extended to cover agricultural workers, unemployment compensation and old-age benefits would then make up to some extent for the inability of the farm worker to save anything out of his low wages.

More small community industries, particularly those using surplus, low-grade, or waste agricultural products, to provide off-season employment for farm workers would increase the opportunities of supplementing earnings in the orchards and berry fields. The settlement on part-time farms or garden tracts of those whose skill and experience suits them for industrial employment is part of the Farm Security Administration program.

Some organization, based on Federal, State, and local cooperation, for the interchange of information between the Pacific Northwest and the Northern Great Plains on conditions in the two areas would be useful to prospective migrants and would reduce adjustment problems.

More than remedial measures, however, are required to absorb the recent migrants and those who may come in the future. Expansion of economic opportunity in the Pacific Northwest is essential if the newcomers are to make their proper contribution to the regional economy. Where such expansion can take place is determined, primarily, by what material resources are available that offer possibilities for further development.

PART I
2. NATURAL RESOURCES

Land

The land resources of Oregon, Washington, Idaho, and western Montana consist of some 188 million acres of cropland, pasture land, range land, and forests. There are less than 16 million acres under cultivation and nearly 32 million acres in farm pasture land. About 60.5 million acres are mainly arid or semiarid range lands, and the remainder is in forests.

Land adapted to farming makes up a very small part of the region's total land resources. At present, only about 5 percent is producing cropland. Some expansion of the area now in crops is feasible, but the possibilities here are definitely limited by physical conditions within the region—notably by the lack of an adequate water supply in many sections. Current estimates set a limit of a little more than 8.6 million acres to the amount of land that might eventually be improved for new or more intensive cropping through proper soil-conservation practices.

The land resources of the four Pacific Northwest States were once all part of the public domain. Now less than half of their total area is publicly owned. Most of the agriculturally productive land has already passed into private ownership. Public lands available for private entry are so nearly exhausted that only about 29.5 million acres of unreserved and unappropriated land remain, and little of this is suitable for farming. The Federal Government owns 107 million acres, consisting largely of Indian reservations, mineral deposit land, parks, water-power and reservoir sites, forest preserves, and grazing lands. The States own between 11 and 12 million acres, and the counties between 3 and 5 million. The remaining 127 million acres are in private hands.

Land-Use Problems

In the past little attention was given to the problem of suitable land use. It was up to the individual farmer to decide whether a given tract of land could be farmed and to what type of farming it was best adapted. No attempt was made to classify the lands according to appropriate use prior to settlement, and the laws governing this settlement often failed to take into account the fact that, for successful cultivation, the amount of land being operated as a unit must vary in accordance with the type of farming.

As a result, serious maladjustments in the use of land have developed in the Pacific Northwest. Farmers have cleared and put into crops land in the humid cut-over forest areas that cannot possibly provide a decent living for them and their families. They have planted lands in the dry-farming wheat country where insufficient rainfall or severe erosion preclude successful crop production over any extended period of time. In some parts of the region, farms are too small to support a family if the land is to be put to the most appropriate use.

Under such circumstances, not only is it impossible for the individual farmer to make a living but the basic land resources of the region are threatened with impairment or destruction. When land is cultivated without regard for the type of farming to which it is best adapted, soil depletion almost inevitably follows. Improper land use increases soil erosion. It has been estimated that on over 12 million acres in Oregon, Washington, and Idaho three-quarters of the top soil and some subsoil have already been lost, and that more than 3 million acres have been destroyed or very severely damaged by wind erosion.

The range lands of the region suffer from overgrazing. They have been used in excess of their grazing capacity, and consequently the range has seriously deteriorated. Proper management of the range to preserve it requires uniform administration of large blocks of land, and this is difficult to accomplish where tracts of range land are made up of small and scattered private holdings. Notable progress toward this objective has, however, been made through the organization of grazing districts under the Taylor Grazing Act of 1935.

Better Land Use

The development of these land-use problems in the Pacific Northwest has made evident the necessity of more scientific use of land, if its productivity is to be maintained and if the maximum value is to be obtained from its use. In 1934 the remaining unappropriated and unreserved public land was withdrawn from homestead entry pending classification. Careful appraisal of the inherent productive capacity of the land is now a prerequisite to the development of all Federal land-use programs, and this principle has received some recognition from the States and from a few counties.

The Bureau of Agricultural Economics and the National Resources Planning Board, in collaboration with other Federal and State agencies, have made an inventory of the lands potentially available for cultivation. Many land classification projects are in progress throughout the region under the auspices of various Federal, State, and local agencies. Still others are needed and should be undertaken as rapidly as possible. When this work is completed, the necessary information relative to the physical characteristics of the land and to the economic factors affecting its use, so essential to a rational land settlement and development program, will be available. In the meantime further settlement on lands that have not been classified should be discouraged; rural zoning should be extended; and, as rapidly as possible, the submarginal lands now in farms should be retired from cultivation through government purchase and set aside as grazing or as forest and recreational areas.

The pattern of land ownership in the Region should be changed in some respects. Proper management of certain types of land calls for the integration of holdings. Not only are transfers from private to public ownership desirable but transfers between private owners and between different government owners are needed to facilitate uniform administration. Long-term leases and associations for the joint use of land have been employed as means of adjusting the size of administrative units to the character of the land.

Restoration of the range lands of the region involves reducing the number of stock to grazing capacity as rapidly as can be done without imposing undue hardship upon the stock owners. The Agricultural Adjustment Administration's range improvement program has done much to facilitate this process on private lands, and the soil conservation districts also offer a means of promoting the conservative use of the private range. A large part of the range land, however, is under public ownership and control. Here the immediate problem is to supplement the insufficient summer range—in some places through the development of irrigated summer pastures—so that the deterioration of the fall and spring range will not be hastened. Any final solution of the problem, however, depends upon the reduction of the number of stock using the public range to the grazing capacity of that range. This is being accomplished in an orderly manner under the program administered by the Grazing Service.

The necessity for conservation is recognized in the management of all Federal lands, and this principle is receiving increasing recognition from the States. The problem of providing for the proper disposition and management of the large areas that have reverted to the counties through tax foreclosures, however, is still a pressing one. Government cooperation with owners or tenants to guide them in determining suitable land use and to assist them in establishing farms of adequate size and in adopting good farm-management practices will facilitate the conservation of the land in private ownership.

Forests

The forests of the Pacific Northwest are of the greatest importance both to the region and to the Nation. About 15 percent of the wooded area of the United States is in the Pacific Northwest and over half of the total volume of saw timber in the country. For the last 10 or more years the region has been producing almost half of the Nation's softwood lumber.

The Pacific Northwest forests cover approximately 100 million acres. The standing timber in the region is estimated at around 883 billion board feet, of which roughly 47 percent is Douglas fir, found west of the Cascades. About 60 percent of this volume of timber is economically available. Of the total timber in the region, 50 percent is in Federal ownership and 42 percent is privately owned.

At present saw-log production accounts for 10.5 billion board feet a year, and minor forest products for another 1.1 billion board feet. There is an average annual loss from forest fires, insects, and disease of 2.3 billion board feet, bringing the current drain on the region's forests to around 14 billion board feet a year.

Estimates of forest growth are more difficult to make. While it is not possible to arrive at any very exact measure, current growth appears to be only about 4 billion board feet annually—much less than the yearly drain. The forest land is sufficiently productive, however, so that even without any great improvement in forest management practices annual growth should eventually exceed drain, and, in the course of time, amount to about 16 billion board feet. The problem is to bring about this increase in growth in time to avert a marked decline of the forest industry with the serious depletion of the resource.

The possibilities of increasing production are definitely limited by the condition of the region's forests. There are a number of areas, especially in southwestern Oregon, where the drain on the forests might safely be increased under sustained-yield management. In far too many communities of the Pacific Northwest, however, any substantial increase beyond the present output of forest products would simply hasten the day in which these communities will find their timber resources depleted and the industry that provides their means of livelihood in a state of collapse. It is probable, therefore, that increased production in the remaining virgin forests would not offset the necessary reduction in other sections where production must be curtailed if the base for the economic life of existing sawmill towns is to be restored and not gradually destroyed.

Sustained Yield

To maintain an adequate supply of marketable timber calls for the replanting of cut-over areas and the sustained-yield management of all growing timber. There are now in the Pacific Northwest some 7 million acres of cut-over and burned-over land that are not restocking. This total includes 17 percent of the forest land of western Washington and 13 percent of that in western Oregon. The proportion elsewhere is much smaller, but these other lands are much less productive than those of the western Douglas fir region. In some areas, the destructive forces of fire and erosion have so depleted the soil that reforestation by artificial means for commercial purposes is no longer feasible. Most of the land, however, is still capable of producing commercial forests under proper conditions.

Sustained-yield management consists, basically, of adjusting the rate at which mature timber is cut to the rate at which the forest is restocking, in order that the old growth may not be exhausted before the new growth is ready for marketing. In this way, the timber resources of the region may be used and, at the same time, rebuilt. Sustained-yield management involves not only the control over the rate of cutting but also measures to insure restocking, protection from fire, disease, and insects, and prevention of waste.

The national forests are already under sustained-yield management, as are a few of the State forests, but practically no progress has been made in this direction on the county forest lands, which are constantly being added to public holdings through tax foreclosures. Moreover, more than one-half of the most valuable timber in the region is privately owned—much of it in small tracts. There are about 40,000 individual owners in Oregon and Washington alone, and the majority of these owners are not in a position, unaided, to undertake sustained-yield management.[3]

To encourage such management will, in most instances, require the cooperative action of individual private owners and of private owners and the Federal and State governments, in order that units of forest land of a size and character suitable for sustained-yield management may be created. Government aid to provide credit facilities for owners who agree to put their holdings under sustained-yield management and public acquisition of both old growth timber and cut-over lands where they are needed to make a sustained-yield program of production possible may be required. Some modification of the tax structure is apt to prove necessary. Finally, cooperative action on the part of private owners and government is essential if the necessary replanting of cut-over land is to be undertaken, and the adoption of good forest-management practices that will increase annual growth encouraged.

Water

No region in the United States has such marked geographic variations in mean annual precipitation. Large areas of the Cascade Mountains, Olympic Mountains, and of the Coast Range have mean annual precipitations of from 80 to 100 inches. The valleys between the Cascades and the Coast Range receive from 30 to 40 inches, but little of this ordinarily falls during the summer months. East of the Cascade Range, the areas of fairly heavy precipitation are confined almost entirely to the rugged mountain regions. The areas suited to agricultural use, with the exception of certain intermountain valleys, receive from 5 to 15 inches of rain. For example, much of the potentially productive Columbia basin area in Washington gets less than 10 inches, and the fertile Snake River basin of southern Idaho less than 15 inches.

These conditions make the problems of water use and water conservation a matter of vital importance. The fact that one-third of the total acreage harvested in 1934 was under irrigation emphasizes the importance of water to Pacific Northwest agriculture. In general, it is true for the region east of the Cascade Range that economically available water supplies are the limiting factors in the expansion of agricultural land use. Even west of the Cascades, supplemental summer irrigation is increasingly being recognized as essential to most effective use of lands.

In many parts of the region, these "water lifelines" are inadequate to serve the areas now under irrigation. Losses mounting into millions of dollars due to water shortage are periodic occurrences in the Snake River basin and elsewhere. In these areas, there is urgent need for the development of supplemental water supplies.

The Columbia River and its tributaries drain an area of 220,000 square miles. This drainage system, with closely related areas, embraces roughly the States of Washington, Oregon, Idaho, and the Rocky Mountain province of western Montana. The coastal streams of Oregon and Washington drain another 36,000 square miles. There are great seasonal and geographic variations in the amount of water these rivers carry, owing to the seasonal and geographic variations in precipitation within the region. This means that there is an excessive amount of water in some sections at some times, and a deficiency of water in other sections at other times, which results in waste of water and necessitates extensive storage. Potential storage capacity in the region is just about sufficient to provide for the 50 million acre-feet of water that may be needed for irrigation and other uses in the future, when all feasibly irrigable land has been reclaimed.

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[3] Since 1939, steps have been taken by several large operators to establish some kind of sustained yield units.

Power

Forty percent of the potential water power of the United States is in the Pacific Northwest. Potential output approximates 15 million kilowatts available 90 percent of the time. Thirteen of the 15 million kilowatts are in the Columbia and its tributaries, which have 30 percent of the total water power of the country. In 1937, the capacity of installed waterwheels amounted to 1.7 million kilowatts, or 14 percent of the national total.

The completion of the Grand Coulee and Bonneville projects will increase the installed capacity of the region to about 4 million kilowatts. An ultimate capacity of 1,964,000 kilowatts is planned for Grand Coulee, and of 518,000 for Bonneville.

Navigation

Harbors for sea-going vessels are available in the Puget Sound area, on the lower Columbia and Willamette rivers, and at various points along the coast where the rivers of western Oregon and Washington flow into the Pacific. The Columbia will soon be navigable for ocean-going vessels as far as The Dalles, 188 miles inland, and the Willamette is navigable for deep-sea shipping as far as Portland, 100 miles from the mouth of the Columbia.

Future Development

Obviously, the water resources of the Pacific Northwest have not one but a number of uses. Since it is possible to develop the same river for irrigation, navigation, and power, large-scale projects for the development of the region's rivers must, in the interest of maximum efficiency and economy, include as many of these uses as are feasible from a physical standpoint and desirable from the point of view of the regional economy. Multiple-purpose development must also be taken into account in the construction of smaller projects. Further, it means that in any plan for the development of the region's water resources, all possible uses must be given consideration to determine which is most important to the well-being of the region or of the community concerned, and other uses then adjusted to this primary one.

As soon as the market for power justifies additional construction and installation, further development of power resources is scheduled as part of the long-term water conservation and reclamation program of the Pacific Northwest. Planned waterway projects will improve the Willamette for inland traffic as far as Eugene, 170 miles upstream from Portland, and the Columbia and Snake as far as Lewiston, Idaho, about 470 miles from the sea. A Columbia River-Puget Sound waterway to connect the Puget Sound district with the Columbia and Williamette systems has also been proposed.

The region's water supply must be conserved and stabilized through flood control and increased storage facilities. Efficient use requires that water be made available to all irrigable lands and to lands now under cultivation where the present water supply is inadequate. Additional water facilities are needed to serve ranches in the grazing area. Elsewhere drainage systems must be constructed to dispose of surplus waters. Overgrazing and timber stripping not only reduce the value of the range and the forest, but they also threaten the water supply itself, destroying watersheds and increasing run-off.

Successful conservation and development of the region's water resources necessitate public action. The States have jurisdiction over the surface waters. Various Federal agencies are concerned in their administration. The Columbia is not only an interstate but an international river. Any comprehensive plan or program to be successfully carried out, or even formulated, requires both interstate cooperation and cooperation between the different Federal agencies and the States. There are, moreover, some problems that cannot be solved except through international negotiation and treaty with Canada.

Minerals

The total value of minerals extracted in the four States in 1937 was $156 million. Of this sum, Montana was responsible for $82 million, Idaho for $41 million, Washington for $26 million, and Oregon for $7 million.

Metals are found chiefly in the mountainous sections of central and western Montana; northern, central, and western Idaho; northern Washington; and southwestern Oregon. Although the region has substantial deposits of nonmetallic minerals, the production of nonmetallics, with a few exceptions, has been of minor importance.

Gold, silver, copper, lead, zinc, and mercury are the principal metals produced. More than $600 million in gold has been taken from the region, most of it from the mines of Montana and Idaho. Idaho has the largest silver-producing mine in the United States and produces more than one-fifth of the Nation's silver, one-fourth of its lead, one-tenth of its zinc, and some gold.

Montana mines are responsible for another fifth of the country's silver, about a fifth of its copper, a part of its gold and lead, a tenth of its zinc, and some manganese. The State is also the Nation's largest producer of arsenic. Washington is now producing copper, zinc, silver, and molybdenum. Oregon is a producer of mercury and mines some gold.

Despite this very considerable production of metals, the region's mineral deposits have neither been fully developed nor even completely explored.

The Nation is deficient in 16 important minerals, which must be supplied wholly, or in large part, by imports from foreign countries. Major deficiencies that might cause serious difficulties in time of war are in antimony, chromium, manganese, nickel, tin, mercury, tungsten, and sheet mica. Domestic supplies of other minerals that are inadequately developed or produced are asbestos, barite, graphite, china, clay, talc, and soapstone. While large quantities of the ferroalloy minerals, except manganese, are not normally required, many alloy steels cannot be made without them.

All these minerals, except nickel, tin, textile asbestos, and sheet mica are found in the Pacific Northwest, and while the quantities produced are not great in relation to total national needs, the region ranks high in the production of certain essential metals, including manganese, chromite, mercury, antimony, magnesite, and platinum. New processes have been carried far enough to indicate the commercial feasibility of producing aluminum, necessary in aircraft production, from the alunites and clays found in Washington, Utah, Idaho, and elsewhere in the region. Tungsten, an essential in the making of certain alloy steels, is produced in small amounts in Idaho, Montana, and Washington. The production of mercury, heretofore limited largely to California and Oregon, is increasing in these and other States, including Idaho.

Increased Production

Exploration and research are the key to the greater development of the minerals of the Pacific Northwest. The mineral-bearing areas of the region have not been fully explored. More geologic surveys and base maps are needed. More complete information on the extent and quality of ore deposits is required. These are tasks for the State geology departments, the United States Geological Survey, and the United States Bureau of Mines.

Through research and experimentation, new or improved methods of extracting and processing ores may be evolved that will make it feasible to mine deposits that are now considered too costly to work or of insufficient value to make their exploitation worthwhile. The large quantities of low-cost electric power now being developed will make it possible to process ores more economically. The construction of mine-to-market roads in areas where there are mineral deposits and the improvement of the waterways will facilitate transportation and reduce its cost. Together, these measures should result in bringing into development mineral deposits now lying idle.

Other Resources

The natural resources of the Pacific Northwest support two other important economic activities—commercial fishing and recreation. In Oregon and Washington the catch of salmon, halibut, and other species of fish amounts to over 150 million pounds a year and produces an annual income of around $25 million, of which about two-thirds comes from the salmon fisheries. In addition, tourists and sportsmen come from other sections of the country each year to fish for trout and salmon, bringing millions of dollars into the region anually in payment for their travel, food, and lodgings, their boats, and equipment.

Under normal conditions, fish are a self-sustaining resource; yet the annual runs of salmon have been growing smaller, and other species once plentiful are now disappearing. There is little possibility of increasing production. Rather, steps must be taken to conserve and build up the fish resources of the Pacific Northwest, particularly the Columbia River salmon, if they are not to be seriously depleted.

To conserve the fish resources of the region it is necessary that both commercial and sport fishing be regulated and that, in the development of the Columbia and its tributaries for other purposes, steps be taken to protect the fish in these rivers. Effective action in this direction calls for the cooperation of the Federal Government with the States.

The installation of fish ladders and the screening of diversion canals and ditches are examples of the type of provision that must be made to protect the fish in a river that is being developed for power or navigation. Some streams should be left untouched as spawning grounds in order that there may be no interference with natural propagation. Artificial propagation is an important aid to maintaining and increasing fish life. Stream pollution must be reduced, particularly in the Columbia and the Willamette, in order to preserve the salmon in these rivers.

The scenic and sports value of the region's mountains, forests, lakes, streams, and coasts has already received wide recognition. It is estimated that over $200 million a year is spent on recreational travel in the Pacific Northwest. The recreational resources support various regional industries that supply goods and services needed in recreational pursuits. Further development of the Pacific Northwest as a recreational area is entirely feasible, and with it will come expansion of regional industries to serve the sportsman and vacationist.

Most of the recreational areas in the region are under public ownership. The Federal, State, and local governments provide the basic facilities and the roads and highways to reach them. Private enterprise supplies the recreation seekers with food and shelter, equipment, and transportation.

Public ownership should be extended to all lands of exceptional scenic or recreational value in the region, not only in order that they may be developed for recreational use but also to protect and preserve their distinctive qualities. Lands already in public ownership should be further improved, and public responsibility extended to the improvement of private facilities and services through education and through inspection and regulation in the interest of public health and safety. There is great need for an interstate agency empowered by the legislatures of Oregon and Washington to preserve the scenic and recreational value of the Columbia River Gorge, in cooperation with Federal, State, county, and local organizations.

Over-All View

Although the Pacific Northwest contains approximately one-tenth of the land area of continental United States, the region thus far has accommodated less than 3 percent of the Nation's population. An inventory of the region's natural resources shows that there are definite possibilities of further development that would provide a livelihood for a considerably larger population. There is a resource base broad and strong enough, if wisely used, to permit a very considerable expansion of industrial activity and a material expansion in agricultural land development and settlement. However, the mere existence of an adequate resource base does not automatically bring about economic expansion. Markets for the additional goods and services that might be produced must be available; the means to realize the possibilities of expansion at hand.

PART I
3. ECONOMIC OPPORTUNITY

The Regional Economy

The source of livelihood for more than three-quarters of the gainfully employed workers in the Pacific Northwest can be traced, directly or indirectly, to land resources—to agriculture, forestry, and dependent industries. This proportion is reached when to the number of persons employed in agriculture and forestry and in the processing of farm and forest products is added an equal number of workers who owe their jobs in the service industries to the existence of the agricultural and forest industries.

Manufacturing accounts for about a fourth of all employment in the Pacific Northwest. However, the per capita figure for value added by manufacture for the region was 25 percent below the national figure in 1937. For the Nation as a whole, the amount of new wealth created by the application of labor, skill, and capital through the manufacturing process amounted to $195 per person. The comparable figure for the Pacific Northwest was $146. The per capita value added by manufacture in the region was well below the national average for all branches of manufacturing activity except food and kindred products, forest products, and paper and allied products. Here the regional average exceeded the national value per capita by 4 percent, 545 percent, and 135 percent, respectively.

The region's balance of trade reflects the same excessive dependence on agriculture and forestry and the same deficiency in manufacturing activity. The products of agriculture and forestry account for over three-fourths of the region's net shipments but for only one-tenth of the net receipts. Manufactures and miscellaneous commodities, including all paper, canned goods, sugar, and the products of minor processing industries, account for nearly four-fifths of the region's imports, but for less than one-tenth of the exports.

This dependence on land and forest resources in the Pacific Northwest does not make for a well-balanced regional economy. Were economic activity more diversified, depressed conditions in agriculture or in the lumber industry would not affect so seriously or so generally the prosperity of the region as a whole. But when three-fourths of all employment depends on lands and forests, then the condition of these resources and of the industries dependent on them is of very vital interest to the entire Pacific Northwest. Not only are large numbers of workers and their families in the industries directly concerned affected, but the regional market for other commodities and services also reflects conditions in these basic industries.

Moreover, such specialization requires that the resources sustaining it be permanently maintained. Exhaustion of the forests or the soils of the Pacific Northwest would destroy the present basis for the economic life of the region, and already forest resources in some areas have been seriously depleted.

In order for the Pacific Northwest to have a more stable and a more abundant economy its commodity-producing industries must be expanded and diversified. The present economy does not represent full and efficient development of all resources. There are additional lands to be brought into cultivation. There should be more manufacturing based on greater utilization of power and minerals and of agricultural surpluses and low-value products. Such development would not only put the regional economy on a more stable and enduring basis but more jobs would be created and incomes raised with increased economic activity in the region.

Agricultural Development

Within recent years, the increase in cropland in the region has not kept pace with the increase in population. The ratio of improved land in farms to population has been on the decrease since 1880. In the 15 years, 1920–1935, there was no net increase in the improved land acreage, but there was a fairly rapid population growth.

The lag in the bringing in of new croplands has, in part, been offset by more intensive farming methods and a decrease in the proportion of the population directly dependent on agriculture. The more intensive use, however, has brought with it impairment of the productivity of the soil. Acreages of indeterminate extent in the Pacific Northwest are unsuited for sustained cropping and should ultimately be shifted to pasture and forest. Until new lands become available, however, pressures of new population seeking full and part-time farm settlement opportunities will not allow very extensive cropland retirement.

To meet population pressure for land, therefore, to replace eroded and depleted lands that should be retired from cultivation, and to keep pace with anticipated industrial growth in the region, a rather extensive program for the development of new croplands is fully justified. It is of the utmost importance, however, unless existing farm problems are to be aggravated, that this expansion in farm acreage be directed in order that the best use may be made of the land and the maximum return enjoyed by the farmer.

Expansion of Farm Acreage

It is estimated that some 21,000 new farm units of economic size are in early prospect in the region by reason of irrigation, clearing, drainage, and diking operations. Recent studies place an ultimate ceiling of 49,000 to the new units that might eventually result from this type of development. However, in addition to providing more farms, such improvements would make for more efficient and productive use of the land already in farms, benefiting some 4 million acres.

Manufacturing

The greatest possibilities for increasing employment in the Pacific Northwest probably lie in the expansion and diversification of manufacturing. The region now imports large quantities of consumers goods and capital equipment from other sections of the country. The importation of many of these commodities is fully justified by the fact that, for one reason or another, they can be manufactured more economically in other regions than in the Pacific Northwest, even when the costs of long-distance transportation are taken into account. There are other products, however, that could be produced at a lower cost, and the market for them increased accordingly, by more intensive use of materials, labor, and capital available within the region.

Many of the raw materials produced in the Pacific Northwest are shipped hundreds of miles for processing. Wool, hides, copper, zinc, and lead are examples of regional products shipped across the continent for manufacture into commodities, and then brought back across the continent for consumption in the Pacific Northwest. Commercial fertilizers are another case in point. The farms of the region have great need of mineral fertilizers, but the cost of importing them prohibits their extensive use. Were the region's deposits of phosphates and potash to be developed, then mineral fertilizers could be put on the market at a price the farmer could afford to pay.

The Pacific Northwest has had few basic industries around which secondary industries might grow. In recent years, some machinery and equipment has been manufactured locally for the region's logging, mining, fishing, and canning industries; and chemicals for the pulp and paper industry are being produced to an increasing extent. The manufacture of such supplies and equipment, however, plays a very small part in the regional economy.

With the availability of Columbia River power, several new basic electrometallurgical and electrochemical industries have entered the region and the entrance of others appears to be in prospect. The current war program has brought about a large expansion of aircraft, ship, and boat-building activities. The new basic metal and chemical industries, supported by regional resources, should be permanent and should lead quickly to the establishment of various fabricating and manufacturing activities. With broad development of this kind, a considerably larger proportion of the ship and aircraft-building activity might be retained in the region in the post-war period than would otherwise be practicable.

The types of manufacturing activity that might be encouraged in order to expand and diversify economic activity in the Pacific Northwest are:

(*a*) Those, based on regional resources, that would carry manufacturing processes as far as possible toward finished products to supply regional needs as well as outside markets.

(*b*) Key basic industries that would induce establishment of secondary and subsidiary industries, particularly electrochemical and electrometallurgical plants that would consume large quantities of the region's low-cost power.

(*c*) Industries that would lower prices of essential commodities needed to maintain soil fertility and agricultural productivity—fertilizers, weed killers, lime, agricultural implements, etc.

(*d*) Industries that would provide employment during slack periods in agricultural and lumbering operations.

(*e*) Diversified local industries processing local raw materials, such as canning plants, wool-processing plants, flax and linen plants, and lumber specialty plants.

(*f*) Factories that are needed to supply related existing industries and to build up integrated industries in fields, such as lumber products, pulp and paper products, iron and steel and their alloys.

(*g*) Decentralized factories that could be converted into plants manufacturing munitions and military supplies in time of war.

Deterrents to Industrial Expansion

Probably the greatest deterrent to industrial expansion in the Pacific Northwest is the lack of a large consuming population. Mass production requires mass purchasing. The region, with a population of under 4 million, does not have this mass purchasing power. Established concerns, particularly in those industries based upon patents, find little reason for expanding into a region if they can supply its wants at a profit from their present locations. It is difficult for new concerns to enter these fields, closely protected by basic or process patents, since it is usually necessary for them to operate under license, which means a cut into their profits. Without special inducements, branches of national concerns will not be established until the local market is large enough to make this expansion profitable.

Aids to Development

In the development of the Pacific Northwest the role of government is particularly important. The Federal Government retains ownership of about half of the land in the region. The development and management of these publicly owned resources have a strategic influence upon the economy of the entire region. The expansion of agricultural opportunity rests to a large extent on government aid. New settlers must have competent advice and assistance. Otherwise their needs will not be met and the region may find itself saddled with an unstable and inadequate farm economy.

The Federal Government alone is capable of planning and financing many of the basic projects that are required to unlock new resources. Large public works, such as Grand Coulee and Bonneville, create new opportunity for industry by making available a cheap and plentiful supply of hydroelectric power and by enlarging the regional market for the products of industry. Improvement of navigation facilities also encourages industrial growth.

Government assistance, however, does not depend solely on Federal action. State governments can assist industrial development by legislation authorizing municipalities, port districts, and other public agencies to plan and develop industrial sites. State agencies should undertake to make available information relative to sources of raw materials and possible markets.

Local governments by providing such essential facilities as roads, water supplies, sewers, and adequate terminals can encourage the location of industries in their communities. The establishment of industrial districts, the provision of land that can be leased at low rentals, and favorable resale rates for electric power from municipal plants are other means by which local governments can stimulate industrial growth.

It is obvious that to overcome the very serious obstacles to industrial development in the Pacific Northwest the most favorable setting possible must be provided for such expansion. This can only be done through cooperative action on the part of the Federal, State, and local governments, in conjunction with private enterprise.

PART I

4. REGIONAL PLANNING AND ADMINISTRATIVE COORDINATION

The importance of Federal and State aids in any program for the expansion of economic opportunity in the Pacific Northwest makes their efficient planning and administration essential. Cooperative action in the formation of basic policies, in the conduct of research, and in the carrying out of specific plans is necessary if the best results are to be obtained. It is also necessary, because of the far-reaching effects of such governmental activities, that they be harmonized with other phases of regional planning. Some coordinating agency is needed to fit all the various parts of a development program into a general plan for the expansion and improvement of the regional economy.

The Pacific Northwest has a Regional Planning Commission, established by the National Resources Planning Board, on which each of the four States is represented, but no provision has been made for the direct representation of the numerous Federal agencies operating in the region. Although these agencies are represented on committees associated with the Commission, there is great need for some permanent central regional planning organization that would include not only representatives of the States and the National Resources Planning Board but also representatives of the Federal agencies concerned with regional development. Few of the proposals that have been made to further economic expansion in the Pacific Northwest have not involved action on the part of one or more Federal bureaus.

It has been suggested that membership on the Regional Planning Commission might be expanded to include representatives from each of the following Federal agencies: The Departments of Agriculture, Commerce, Labor, Interior, and War; the Federal Loan, Security, and Works Agencies; and the Bonneville Power Administration. This group would also act as a separate planning agency to coordinate Federal activities in the region.

If the Regional Planning Commission were to be enlarged to include representatives of the Federal bureaus in the region, the total membership would be increased from 5 to 13 or 14. While a deliberative body of this size is less wieldy than a smaller group would be, this difficulty may be obviated in part by the use of special subcommittees. There are already two technical committees—the regional Drainage Basin Committee and the Land Advisory Committee—functioning in the Pacific Northwest, and others are needed.

While it is not the function of a planning agency to assume administrative responsibility, it is of necessity concerned with administration, both in the making and in the carrying out of plans. The successful undertaking of a development program in the Pacific Northwest requires coordinated administrative activity on the part of State and Federal agencies, and in many cases of local government agencies as well.

The techniques for administrative coordination will have to be developed gradually. The development process, however, will be facilitated by intradepartmental coordination, by increased awareness of the need for related action on the part of government officials, and by specific instruction from headquarters to field offices authorizing the necessary cooperation.

PART II
AGRICULTURAL LAND DEVELOPMENT*

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*Including a Joint Study by the Bureau of Agricultural Economics, U. S. Department of Agriculture, and the National Resources Planning Board, Region 9; 1940–41.

[1] Until July 1941.

(Above, left) Raw land: sagebrush prairies in the Columbia River Basin, Washington.

(Above, right) Raw land: modern stump-clearing practices, Olympic Peninsula, Washington.

(Above) Water storage is of vital necessity in the Pacific Northwest. Tieton Dam, Yakima Project, Washington.

(Right) More than a third of the crop-producing acreage of the region depends upon irrigation for its water supply.

FIGURE 1. Land Development and Use in the Pacific Northwest

PART II

1. REPORT OF THE PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION

FOREWORD

Any report on proposed development of agricultural land, whether it be in the Pacific Northwest or elsewhere, must come to grips at once with the widely circulated notion that new agricultural lands are not needed in the United States. So long as there are surplus agricultural products, it is contended, the development of new lands for crop production will only aggravate the "farm problem." This argument has enough justification to deserve careful analysis.

On the other hand, a sharply opposing point of view is held by many students of land economy. They contend that the development of new agricultural land, whether in the Pacific Northwest or elsewhere, is justifiable from a social standpoint so long as we have great numbers of people who wish to and cannot otherwise secure a foothold on the land, and that such development, as we are forced to retire worn-out land already in use, may be sound from an economic as well as a social standpoint.

Turning first to the so-called agricultural surplus problem it is necessary first to face the bizarre fact that the United States has had during the periods of most acute agricultural surplus at least one-third of its population receiving far less food and clothing than are necessary to maintain health and decency.[1] Curtailment and limitation of agricultural production—especially the export commodities cotton, wheat, tobacco, and pork products—was indeed a practical necessity forced upon us by the economic chaos of the depression, but such palliatives must not be allowed to prevail as fixed policy. Already the national economy has been thrown into high gear in a mighty effort to produce the tools for defense. It is necessary now to devise the ways and means for keeping it in high gear producing the goods and services needed in peacetime. Depression myopia has seriously impaired our vision of the needs of our Nation in the healthy state of full employment. We need to be reminded that no free society can expect to endure by restricting production of food and clothing at a time when great numbers of the people are inadequately fed and clothed. The bitter paradox of poverty in the midst of potential sufficiency will not permanently be tolerated by a free people.

To remedy the existing serious dietary deficiencies of the American people [2] would require a large increase in the consumption of dairy products, fresh meat, leafy vegetables, and fresh fruits. The vegetables and fruits would not require any large expansion in croplands, but the requirements for dairy and animal products would necessitate a larger acreage than is now devoted to that purpose. It has been estimated that the acreage necessary to lift *domestic* food consumption to the level of existing freely chosen diets that can be rated "nutritionally good" would require slightly more cropland than was being harvested in recent years.[3]

The effective demand for food and clothing is intimately related to the fluctuations of the total national income. Even without any notable improvement in the distribution of consumer incomes, there is clear evidence that a mounting national income will generate a parallel increase in the consumption of food and clothing. The National Resources Committee found that a national consumers' income of $60 billion, distributed according to the 1935–1936 pattern, creates effective demand for $17 billion worth of food and $5.4 billion worth of clothing. With no fundamental change in the income distribution and no change in price level, an $80 billion national income generates demand for almost $20 billion worth of food and about $7 billion worth of clothing.[4] The current national income will approach $85 billion in 1941, and under the stimulus of the defense effort it will probably pass the $100 billion level in 1943.[5]

The facts cited above are emphasized in the belief that the agricultural surplus problem cannot be isolated from the more general problem of attaining the full utilization of the national resources—especially the labor force. Full employment, as will shortly be demonstrated by the defense effort, generates a national income of about $100 billion.[6] With such an income, the problem of crushing agricultural surpluses will largely disappear. If the Nation and the world are ultimately to succeed in the reconstruction of economic life, the national agricultural and land policy should be oriented toward the income level that would prevail with full employment.

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[1] A study of consumer incomes and expenditures covering the year 1935–1936 shows that one-third of the American population were at that time subsisting on a diet valued at less than 20 cents per day per person. This figure includes the imputed value of home-produced food. See National Resources Committee: *Consumer Expenditures in the United States,* 1935–1936, page 51.

[2] It has recently been disclosed that about 40 percent of the men called under selective service for induction into the armed forces have been rejected for reasons of physical defects. A large proportion of these defects are attributed to malnutrition.

[3] U. S. Department of Agriculture: "Food and Life," *Yearbook,* 1939, pp. 44, 398–402.

[4] National Resources Committee, *op. cit.*

[5] This estimate is based on 1940 exchange value of the dollar. The monetary income may be considerably higher. See National Resources Planning Board, *After Defense—What?*, August 1941.

Furthermore, there is need clearly to comprehend what is happening to croplands now in use. In a broad belt extending from Canada to Mexico across the Great Plains where nearly one-third of the Nation's farm population lives, there has been a major land-use catastrophe. The 1940 Census discloses that during the past decade some 700,000 people, or about 7 percent of the persons who in 1930 gained their livelihood from the soil of the 9 Great Plains States,[7] left the farms because of drought, erosion, and various other causes. Some of these have sought new homes in other regions, including the Pacific Northwest. Many are stranded in small towns that cannot provide adequate opportunities for self-support. No land development program now imaginable could provide farm resettlement opportunities for all of these rural people, but at least a part of them should be encouraged to reestablish themselves in some locality where farming can be made reasonably secure.

While the Great Plains unquestionably constitute one of the Nation's most serious land-use problems, the slow, insidious forces of soil depletion are at work in all parts of the country. The National Resources Board's Land Planning Committee, after Nation-wide studies and investigations, estimated that 35 million acres of formerly good farm land have been essentially destroyed, insofar as cultivated crops are concerned, and have permanently gone out of production. From about 125 million additional acres the topsoil has been washed away, leaving the land in a seriously impaired condition. Inevitably a substantial part of this area will go out of production.[8] The serious character of these conditions can best be appreciated by recalling that the total cropland harvested in the United States in 1939 was 311 million acres.[9] If, as a nation, we could cease abusing the soil tomorrow, we would retire from crop production about 20 million acres that are too steep or otherwise unsuited for continuous cultivation.[10] The program for retirement of submarginal croplands unfortunately has been at a standstill for several years, due largely to public indifference and opposition. The opposition, in part, however, sprang from the failure to parallel the retirement program with a simultaneous and well-coordinated development of new lands. When meritorious conservation programs are needed in the post-defense period, these two aspects of a sound national land program should deliberately be geared together.

In the Pacific Northwest, the problem of economic demand for farm lands is acute. Within the 1930–1940 decade, farm population of Washington, Oregon, and Idaho increased by more than 85,000 persons;[11] cropland harvested in the same decade shrank from 9.7 million acres to 9.3 million acres, a decrease of 400 thousand acres. Cultivated land (harvested, crop failure, fallow, and idle) decreased from 14.5 million acres to 14.2 million acres.[12] Thus in the decade in which the farm population increased by almost 6 percent, the acreage of harvested land declined by 4 percent and the acreage of all cultivated land by 2 percent. In this same period the total population of the three States increased by 13 percent.

Recent and prospective development of new manufacturing and fabricating industries based primarily on the region's electric energy resource has, without doubt, opened a cycle of substantial industrial growth. This will, at the same time, expand the region's home market for many agricultural products. These conditions and prospects are discussed in greater detail in part III of this report.

While the Pacific Northwest does produce substantially more of certain agricultural products than are consumed by its present small population, it can hardly be contended that the region is overdeveloped in agriculture. Such overdevelopment as may exist might better be described as overspecialization, and at least a part of this can be attributed to the limited supply of cultivable land. There are, for example, in all parts of the region farm units that have too small an acreage of cropland to permit the development of a well-balanced general farm enterprise. Not having at their disposal sufficient cropland for a profitable general farm, many operators are induced to attempt the production of some specialty crop. A few succeed, but many fail after attempting one crop after another. If greater stability is to be attained, it will probably be necessary to shift the pattern of Pacific Northwest agriculture further away from highly specialized types of enterprise toward an expansion of general farming. This shift will not be possible without considerable expansion of cultivable land, not only within existing farm units but also in new farms. The inventory covered by this report shows that about half of the new lands that might feasibly be developed are associated with farm units that now have a crop acreage too small to provide an adequate income for the operator.

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[6] *Ibid.*, p. 5.

[7] These include Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Kansas, Oklahoma, and Texas. Every one of these States lost farm population in the 1930–1940 decade. See Census Bureau release Series P–5, No. 6, April 23, 1941.

[8] National Resources Board, *Report on National Planning and Public Works in Relation to National Resources*, 1934, p. 161.

[9] See Census Bureau Release dated February 5, 1941.

[10] National Resources Board, *op. cit.*, p. 110.

[11] See Census Bureau Release, p. 5, No. 6, April 23, 1941.

[12] Census Bureau Releases, Idaho, S–39, March 13, 1941; Oregon, S–31, March 1941; Washington, S–35, March 10, 1941.

The situation with respect to farm income and farm opportunity will also be improved in many areas if farm woodlands are maintained and carefully managed on some of the less arable lands of the unit.

The trend of production on additional lands developed in the Pacific Northwest, as the inventory discloses, will be away from the great surplus crops and toward the generally nonsurplus products of general farming. Operations on lands reclaimed by irrigation in the semiarid interior and by clearing in the humid coastal regions will be toward the food items included in the more liberal diet—dairy products, meats, poultry, eggs, vegetables, and fruits—and away from the dry-farming grains. There is no indicated tendency toward the production of surplus nonfood products (such as cotton or tobacco), although the production of materials for chemurgical industries may ultimately absorb the capacity of some new lands. It is particularly significant, however, that the new land development in the region, as it comes along, will be in accord with the desirable and feasible expansion of the protective diet—a matter that has interested many leaders concerned both with agricultural production and with the improvement of our standards of nutrition and health.

The sensible policy for the Pacific Northwest would involve a gradual and orderly development of its new agricultural lands with special care that development be limited to those lands best suited to permanent agricultural production. This report is designed to lay the groundwork for implementing such a policy.

THE PLACE OF AGRICULTURE IN THE REGIONAL ECONOMY

The Present Land Use Pattern

The three Pacific Northwest States and the Rocky Mountain area of Montana contain about 188 million acres. Of this total, less than one-third (51 million acres) is in farms; and of the farm land, less than one-third (16 million acres) is cultivated. Crop failure and the summer fallow system generally practiced in the dry-farming sections further reduce the harvested acreage to about 10 million acres. In the final accounting, therefore, the producing cropland within the Pacific Northwest is limited to about 5 percent of the total land area. Figure 2 gives a visual summary of the status of agricultural land use as of 1935.

About two-thirds of the land in farms consists of pasture, woodland, and range lands, most of which are used for the grazing of livestock. In addition to the farm land available for grazing, there are much larger areas in the forests and on the public domain that are used for grazing. In large areas of the region the farm lands and the croplands serve as a base of operations for a widely extended use of nonfarm grazing lands.

Of the 10 million acres of harvested cropland in the region, 4.2 million acres are in wheat. About an equal acreage is devoted to the production of hay and the principal feed grains—barley, oats, corn, and rye. The remaining 1,600,000 acres are in the more specialized crops: fruits and nuts, peas and beans, potatoes, small fruits, and truck crops. A considerable acreage is used for the production of various seeds. Figure 3 shows the average harvested acreage of some 32 crops during the 10-year period 1928–37.[13]

In addition to agricultural crops shown in figure 3, timber harvested from farm woodlands assumes significant proportions and constitutes an important crop in the farm economy of wooded areas.

Economic Dependency on Agriculture

Agriculture and the various processing industries based upon its products provide a principal source of gainful employment. The rural farm population, according to the 1940 Census, includes 39 percent of the total population of Idaho, 31 percent of Montana's population, 24 percent of Oregon's, and 20 percent of Washington's. (See table 1.) In the four States considered as a whole the farm population amounts to 25 percent

TABLE 1.—*Farm population and total population, Pacific Northwest States, 1940*

States	Total population	Rural farm population (preliminary data) [1]	Farm population as percent of total
Idaho	524, 873	203, 616	38. 8
Montana	559, 456	175, 271	31. 3
Oregon	1, 089, 684	259, 638	23. 8
Washington	1, 736, 191	339, 950	19. 6
Total	3, 910, 204	978, 475	25. 0
Idaho, Oregon, Washington	3, 350, 798	803, 204	24. 0

[1] Census Bureau Release Series P–5, No. 6, Apr. 23, 1941.

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[13] For Idaho, Oregon, and Washington. Data on a county basis suitable for compiling a break-down for western Montana are not available.

TABLE 2.—*Employment in food products manufacturing and processing, 1939*

State	Wage earners and salaried employees census of manufactures (preliminary)	Number of covered workers under unemployment compensation system [1]	
		Minimum month	Maximum month
Idaho	[2] 2,774	2,938	5,528
Montana	[3] 2,152	2,901	4,819
Oregon	[4] 10,041	8,850	19,777
Washington	[5] 10,619	14,965	26,644
Pacific Northwest	25,586	29,654	56,768
Idaho, Oregon, Washington	23,434	26,753	51,949

[1] Idaho and Montana laws cover every employer of 1 or more employees, Oregon every employer of 4 or more, Washington every employer of 8 or more.

[2] Includes beet sugar, canned and dried fruits, cheese, creamery butter, flour and grain-mill products, malt liquors, meat packing wholesale, poultry dressing wholesale, prepared feeds, food and kindred products n. o. s.

[3] Same as for Idaho but does not include poultry dressing.

[4] Includes biscuit, cracker and pretzels, bread and other bakery products, candy, canned and dried fruits, canned fish, cheese, butter, condensed milk, slaughtering, flour and other grain-mill products, food preparations n. e. c., ice cream, ice, meat packing, beverages, poultry dressing, preserves, vinegar and wines.

[5] Includes canned and dried fruits, cheese, creamery butter, condensed and evaporated milk, flour and grain-mill products, food preparations n. e. c., macaroni-noodles, etc., malt liquors, meat packing wholesale, pickled fruits and vegetables, etc., poultry dressing wholesale, prepared feeds, preserves—jams, etc., frozen foods, sausage not made in packing houses, vinegar, wines, other food and kindred products n. o. s.

of the total. In Idaho, Oregon, and Washington it amounts to 24 percent.

Recent data on the gainfully employed in the various types of industry are not yet published. It is possible, however, to derive a rough concept of the number of workers that are employed by the agricultural processing industries. The preliminary data of the 1939 Census of Manufacturers show that there are over 25 thousand salaried workers and wage earners employed in manufacturing enterprises based directly upon agricultural products produced within the region. Four-fifths of this number are about equally divided between Washington and Oregon. The remaining one-fifth is about evenly divided between Idaho and Montana. Monthly employment reports submitted to the State unemployment compensation commissions show that these industries provide short-term employment to a large number of additional workers. Canneries and similar processing plants doubtless account for the major portion of the peak months' employment. Although the data are not in all respects comparable and must be used with some reserve, it is of interest to compare them with the employment figures of the Census of Manufactures (table 2).

TABLE 3.—*Estimated value of net shipments of agricultural products and of all commodities by rail and waterborne freight from Pacific Northwest States 1934–38*

[In millions of dollars]

Year	Idaho			Montana			Oregon		
	Agricultural products	All commodities	Agricultural products as percent of all commodities	Agricultural products	All commodities	Agricultural products as percent of all commodities	Agricultural products	All commodities	Agricultural products as percent of all commodities
			Percent			*Percent*			*Percent*
1934	61.4	77.7	79.9	73.5	100.7	73.0	50.7	108.5	46.7
1935	59.2	72.7	81.4	95.0	131.6	72.2	64.0	134.8	47.8
1936	86.1	114 5	75.2	80.4	132.3	60.8	66.0	161.7	41.0
1937	84.3	128.2	65.8	62.5	136.6	45.8	76.4	189.1	40.4
1938	70.5	100.5	70.1	50.1	90.6	55.3	77.2	180.8	42.7
Average	72.3	98.7	73.3	72.3	118.4	61.1	66.9	155.0	43.2

Year	Washington			Pacific Northwest		
	Agricultural products	All commodities	Agricultural products as percent of all commodities	Agricultural products	All commodities	Agricultural products as percent of all commodities
1934	98.2	184.8	53.1	252.2	419.1	60.2
1935	100.5	190.9	52.6	282.2	476.5	59.2
1936	92.6	221.6	41.8	283.3	557.1	50.9
1937	93.8	270.9	34.6	274.8	629.3	43.7
1938	70.7	210.1	33.7	235.2	505.2	46.6
Average	91.2	215.7	42.3	265.5	517.4	51.3

Source: Pacific Northwest Regional Planning Commission, *The External Trade of the Pacific Northwest 1934–1938.*

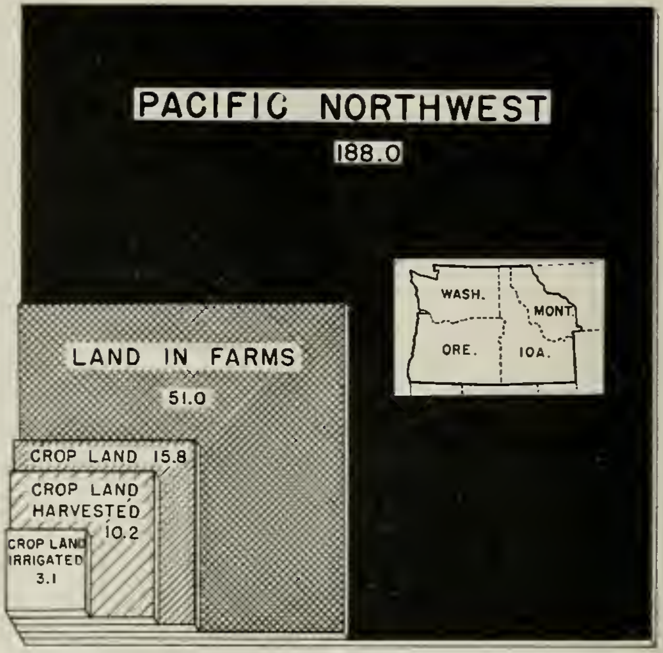

FIGURE 2.—Land in Farms and Crops, 1934.

(Figures indicate millions of acres.)

Source—U. S. Census of Agriculture, 1935.

The fairly large number of women employed in the food-processing industries makes it rather difficult to estimate the total number of persons that draw their support from such employment. If each employed person had two dependents, the total would be at least 75 thousand during the normal periods and about 150 thousand during the peak months. If it be assumed that there is an average of 100 thousand persons dependent on this type of employment and that the large majority of the rural farm population is wholly dependent on agriculture, the total directly dependent upon the production of agriculture must be about 1,080,000, or 28 percent. For the three States Idaho, Oregon, and Wash-

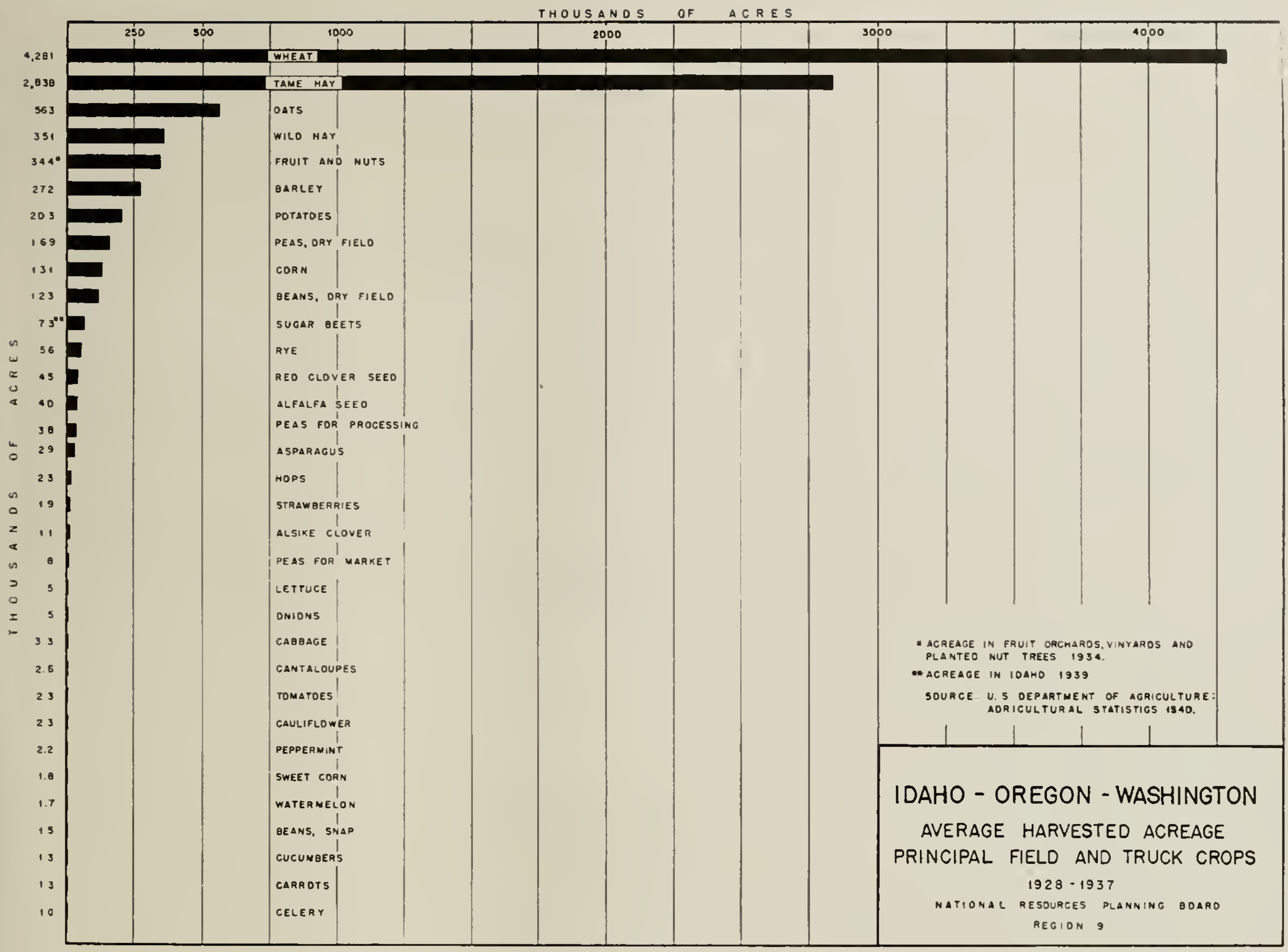

FIGURE 3

ington, the total dependence on the basis of similar assumptions must be about 1,070,000, or 32 percent. The higher dependency in these three States is due to the greater development of the processing industries .

Another approach to the measurement of the extent of economic dependency on agriculture is available through a study of the region's external trade over the period 1934–38.[14] In this study, it has been possible to determine the approximate tonnage and value of the annual net shipment or net receipt by rail and waterborne freight for each of some 150 commodity classifications. Table 3 shows the estimated value of the net shipments of agricultural products in comparison with the total net shipments of all commodities.

The average total value of the net shipments of agricultural products was about $265 million or 51.3 percent of the total net shipments of all commodities. Idaho and Montana are notably more dependent upon agriculture than are Oregon and Washington. It is significant that during depression years, agricultural production remained at a higher level than did other types of activity. Even with very low price levels for its products, agriculture continued to support the regional economy relatively better than did other types of industry. The reason, of course, lies in the fact that farms keep on producing in the face of adverse economic conditions that may cause industrial plants to close down. In spite of the serious conditions which have confronted agriculture, it has remained a source of great strength in the regional economy. So great an asset should never be neglected in the plans for regional development.

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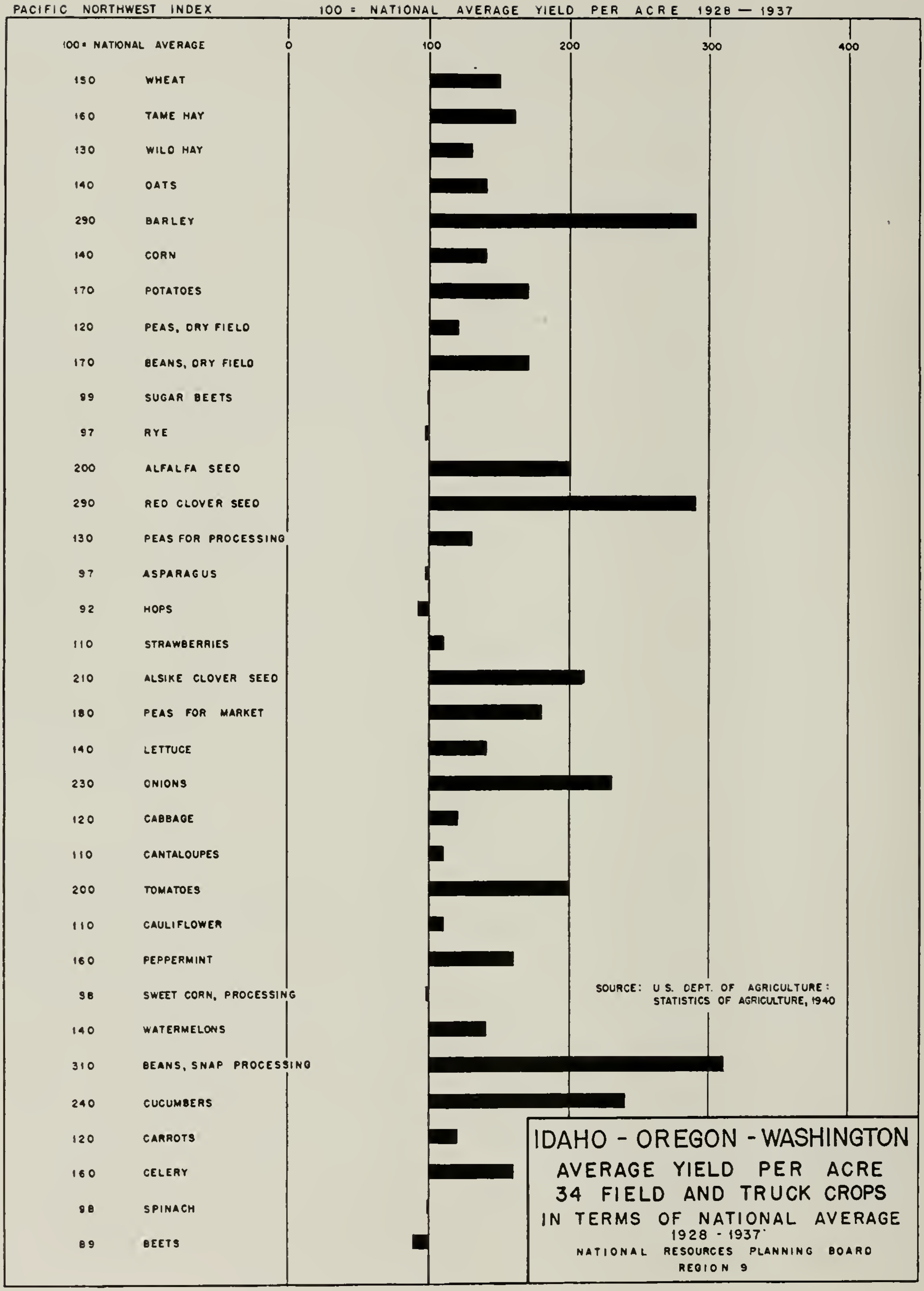
[14] Pacific Northwest Regional Planning Commission, *The External Trade of the Pacific Northwest*, 1934–38.



SOURCE: U. S. DEPT. OF AGRICULTURE:
STATISTICS OF AGRICULTURE, 1940

IDAHO - OREGON - WASHINGTON
AVERAGE YIELD PER ACRE
34 FIELD AND TRUCK CROPS
IN TERMS OF NATIONAL AVERAGE
1928 - 1937
NATIONAL RESOURCES PLANNING BOARD
REGION 9

FIGURE 4

Assets of the Present Agricultural Economy

The cultivated acreage in the Pacific Northwest (16 million acres) constitutes about 8.5 percent of the total land area. In productive power, however, the lands now in use compare rather favorably with those of the Nation at large. Figure 4 shows that the average per acre yield of principal crops grown in the Pacific Northwest is above the national average.

The reasons for this high productivity per acre can readily be appreciated. In the first place, there has not yet been any long-continued pressure on the land resources of the region. The better lands were occupied first, and the use of submarginal land has not gone so far as in many other sections of the country. This does not imply, of course, that there is no submarginal land problem and that no effort is necessary to cope with these problems we have or to prevent more serious ones from developing. Other factors contributing to high yields per acre are such practices as irrigation and summer fallow which, though they do increase yields, increase production costs as well. The fact that good lands in the Pacific Northwest are highly productive tends to lead certain persons to think that any and all lands that can be cultivated at all might be used for crop production. The need, therefore, for proper determination of use capability of new lands that may be brought under cultivation is all the more urgent.

In the areas west of the Cascade Range, climatic conditions are generally favorable for a highly stabilized production of most crops. Rarely does this region suffer seriously from lack of precipitation during the early growing season. There are, however, deficiencies of moisture in July and August which may, in time, be remedied by extensive supplemental irrigation. The water supply is available from surface and underground sources, and feasible methods for its use are steadily being developed.

In the irrigated sections east of the Cascade Range, risk and uncertainty are relatively low. Wherever an ample supply of irrigation water is assured, the probabilities of crop failure are small indeed. In part of the irrigated area, notably the Snake River Basin, there is a serious shortage of water for the croplands now under irrigation. These shortages, which in most cases can be remedied by development of supplemental storage, cause periodic losses that run into millions of dollars. The improvement of this situation is a vital part in the regional land-development program.

Farm forestry is a vital asset to the farm economy in many wooded areas of the Pacific Northwest—notably western Oregon and Washington, northeastern Washington, northern Idaho, and northwestern Montana—and offers considerable opportunity for expansion and improvement through acquisition, rehabilitation, and proper management of farm woodlands and through better marketing facilities.

Technical progress in all phases of agriculture and in farm management has been much in evidence for the past four or five decades. All the States maintain excellent colleges of agriculture, experiment stations, and extension services. Notable progress has also been made more recently in the improvement of extensive land uses. Grazing lands that had been depleted of their forage cover are, in many large areas, undergoing systematic treatment designed to restore their productivity and to provide against future damage from overgrazing.

If land use in the Pacific Northwest can be directed further along conservational lines and in conformity with the highly variable use capability of the lands, it should be possible to erect and maintain an agricultural industry of even greater strength and stability than at present.

Liabilities in Land Use

The liabilities now existent in the regional agricultural system have, in part, been touched upon. One of these is the heavy reliance upon certain specialized crops, such as wheat, fruits, and certain types of truck and seeds. The market for these products, extending as it does throughout the Nation and to foreign countries, is subject to all the hazards of national and international trade. Difficulties of marketing in the international field have been compounded by tariffs, quotas, exchange restrictions, embargoes, blockades, and war. The combined influence of these interferences has been painfully felt in many parts of the region.

Another liability is present in the high costs that are involved in the developing of irrigated, drained and cleared lands. With heavy investments tied up in the lands, there is great pressure to put them to the most intensive use that is practicable. This usually implies specialization in place of general farming. The specialization is very likely to require, at certain seasons of the year, a large supply of migrant agricultural workers who, in turn, cannot find stable employment or any kind of reasonable economic security. The social problems created thereby soon involve social costs that are borne by the whole community.

Considerable areas of the region are beset with rather critical land-use problems. The general location of these areas is indicated in figure 5, which shows the three principal types of maladjusted use as blocked out in studies made several years ago. A considerable part of the problem areas coincides with the areas proposed for land development projects. The program, therefore, will have important remedial influences fully as

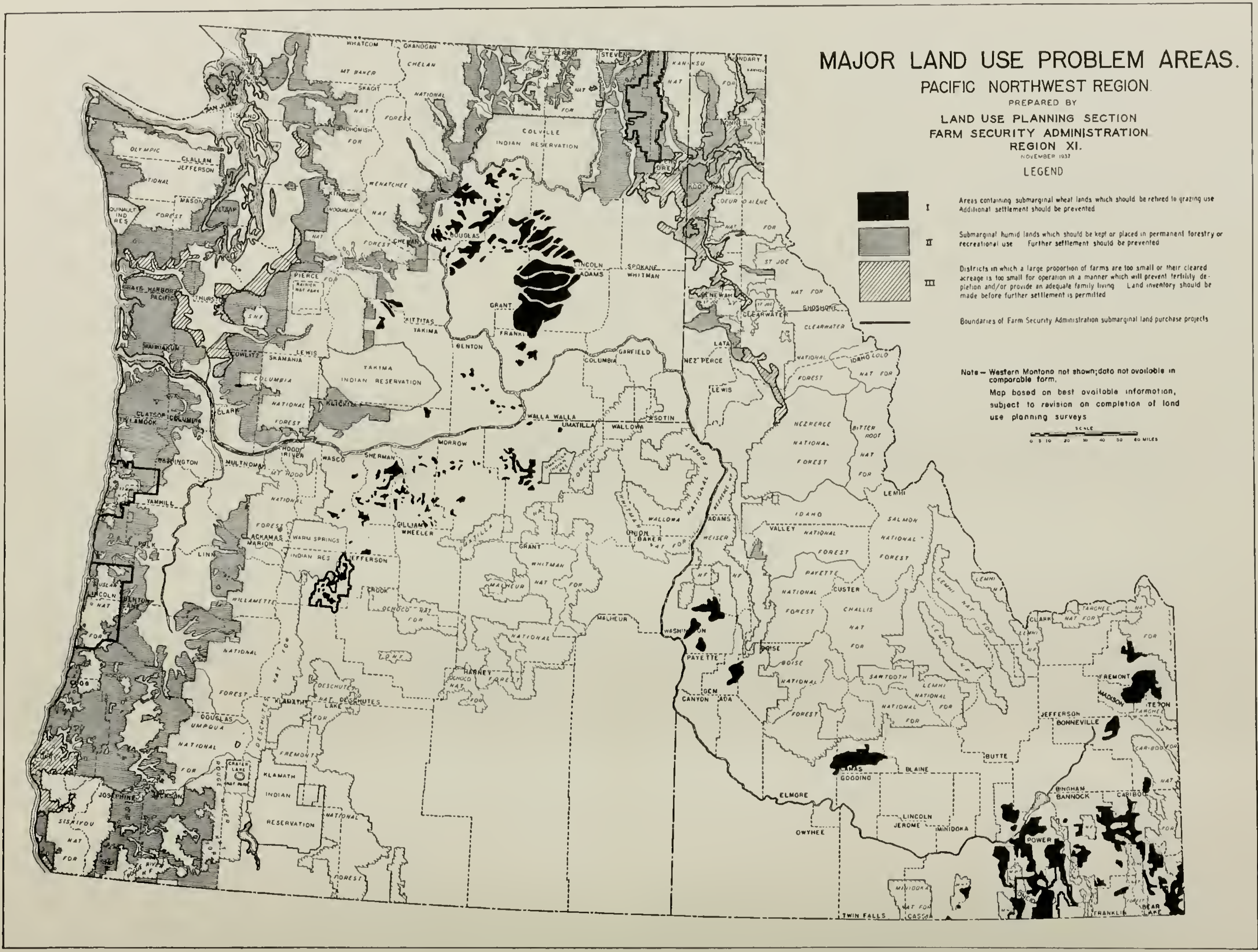
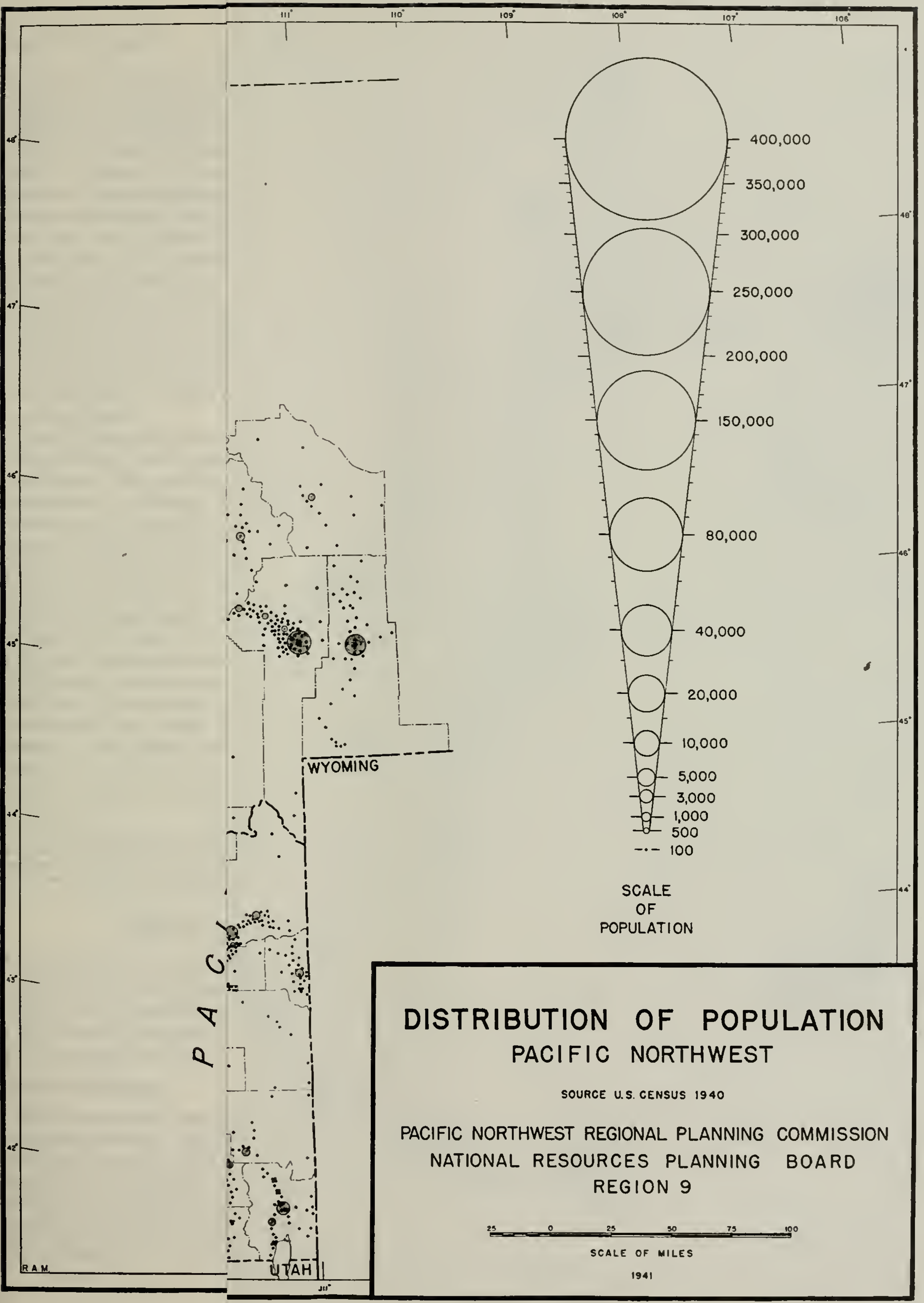

MAJOR LAND USE PROBLEM AREAS.
PACIFIC NORTHWEST REGION.
PREPARED BY
LAND USE PLANNING SECTION
FARM SECURITY ADMINISTRATION
REGION XI.
NOVEMBER 1937
LEGEND
I
Areas containing submarginal wheat lands which should be retired to grazing use Additional settlement should be prevented
II
Submarginal humid lands which should be kept or placed in permanent forestry or recreational use Further settlement should be prevented
III
Districts in which a large proportion of farms are too small or their cleared acreage is too small for operation in a manner which will prevent fertility depletion and/or provide an adequate family living Land inventory should be made before further settlement is permitted
Boundaries of Farm Security Administration submarginal land purchase projects
Note — Western Montana not shown; data not available in comparable form.
Map based on best available information, subject to revision on completion of land use planning surveys
SCALE
0 5 10 20 30 40 50 60 MILES
WHATCOM
OKANOGAN
CHELAN
MT BAKER
SKAGIT
NATIONAL
FOREST
SNOHOMISH
STEVENS
COLVILLE INDIAN RESERVATION
OLYMPIC
CLALLAM
JEFFERSON
QUINAULT IND RES
MASON
KITSAP
WENATCHEE
DOUGLAS
LINCOLN
ADAMS
SPOKANE
WHITMAN
GRANT
FRANKLIN
PIERCE
RAINIER NAT PARK
GRAYS HARBOR
PACIFIC
THURSTON
KITTITAS
YAKIMA
YAKIMA INDIAN RESERVATION
BENTON
WAHKIAKUM
COWLITZ
SKAMANIA
LEWIS
COLUMBIA NATIONAL FOREST
KLICKITAT
CLARK
CLATSOP
COLUMBIA
TILLAMOOK
WASHINGTON
MULTNOMAH
HOOD RIVER
WASCO
SHERMAN
MORROW
GILLIAM
WHEELER
WALLA WALLA
UMATILLA
GARFIELD
ASOTIN
WALLOWA
UNION
BAKER
GRANT
YAMHILL
POLK
CLACKAMAS
MARION
WARM SPRINGS INDIAN RES
JEFFERSON
LINN
BENTON
LINCOLN
CROOK
WILLAMETTE
WHITMAN NAT FOR
MALHEUR
HARNEY
DESCHUTES
LAKE
KLAMATH
KLAMATH INDIAN RESERVATION
FREMONT
DOUGLAS
UMPQUA NATIONAL FOR
COOS
CRATER LAKE NAT PARK
JOSEPHINE
JACKSON
SISKIYOU NAT FOR
ROGUE RIVER
BOUNDARY
KANIKSU NAT FOR
KOOTENAI
COEUR D'ALENE
ST JOE
BENEWAH
SHOSHONE
CLEARWATER
LATAH
NEZ PERCE
LEWIS
IDAHO LOLO NAT FOR
NEZPERCE NATIONAL FOREST
BITTER ROOT NAT FOR
IDAHO
VALLEY
ADAMS
WEISER
WASHINGTON
PAYETTE
GEM
CANYON
ADA
BOISE
BOISE NATIONAL FOREST
PAYETTE NATIONAL FOREST
SALMON NATIONAL FOREST
LEMHI
CUSTER
CHALLIS NAT FOR
SAWTOOTH
LEMHI NATIONAL FOR
CAMAS
GOODING
BLAINE
ELMORE
OWYHEE
LINCOLN
JEROME
MINIDOKA
TWIN FALLS
CASSIA
BUTTE
CLARK
FREMONT
MADISON
TETON
TARGHEE
JEFFERSON
BONNEVILLE
CARIBOU
BINGHAM
BANNOCK
POWER
ONEIDA
FRANKLIN
BEAR LAKE

FIGURE 5



DISTRIBUTION OF POPULATION

PACIFIC NORTHWEST

SOURCE U.S. CENSUS 1940

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

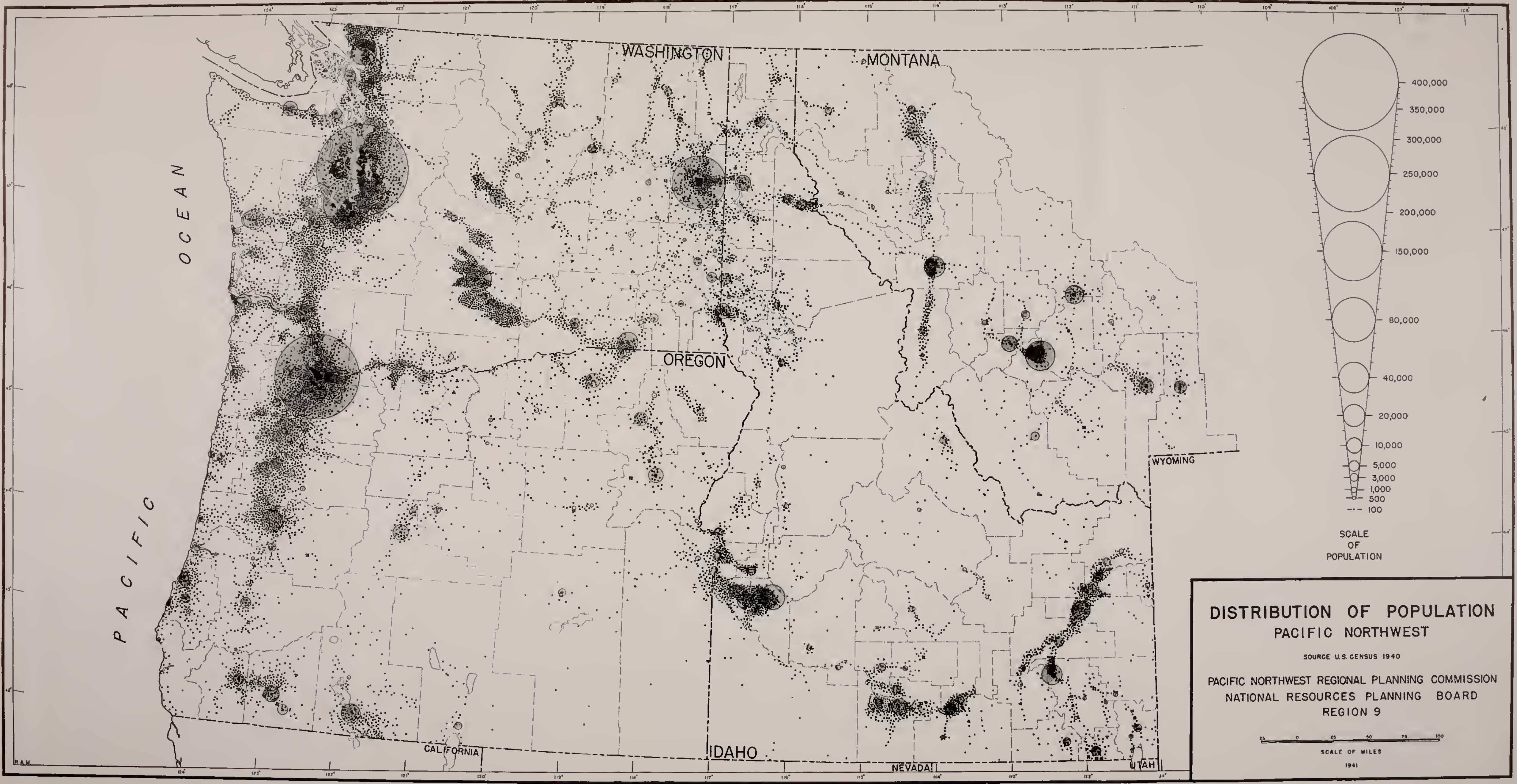

WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
CALIFORNIA
NEVADA
UTAH
PACIFIC
OCEAN
400,000
350,000
300,000
250,000
200,000
150,000
80,000
40,000
20,000
10,000
5,000
3,000
1,000
500
100
SCALE OF POPULATION
DISTRIBUTION OF POPULATION
PACIFIC NORTHWEST
SOURCE U.S. CENSUS 1940
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
1941

Figure 6

valuable to the region and the Nation as the general expansion of the agricultural economy.[15]

The Type I problem areas indicated on the map by solid black contain, for the most part, submarginal wheat lands. In most of the area rainfall is insufficient to assure any reasonably stable production. Even with the practice of alternate-year fallowing, the average yield is less than twelve bushels per acre—six bushels on the annual basis. The periodic crop failures have resulted in farm abandonment, deterioration of buildings, fences, and roads. Soil erosion by wind and water has done considerable damage. Rehabilitation, except in those favored sections where irrigation is feasible, will require that much of the land be returned to grass and that cash grain farming be replaced with range livestock or similar extensive use.

Type II problem areas contain the so-called "shoestring valleys" and "stump ranches" that fringe the forest lands. In most cases a very limited acreage is available for cultivation in the narrow valley floor. If the slopes are cleared for cultivation, erosion at once becomes a problem. Schools and roads are extremely high in cost and both are poor in quality. In many of these areas there is opportunity for supplemental off-the-farm employment in the forests and in providing recreational services. Where opportunity exists for a stabilized farm-forest economy of this type, it might well become an asset and should be encouraged. In other parts the existing well-located farm units may be expanded to a more economic size by additional clearing. As a general rule, however, the lands in this area are not well suited to agriculture. Much care should be taken to insure that further settlement be confined to the better and more accessible parts. A considerable part of the lands now in farms should go back to forest. Limited areas may be suitable for grazing if practicable methods can be devised to keep down the growth of brush.

Type III areas are those that contain a heavy concentration of farms too small to provide the operator's family with an adequate living. In the western Washington section these adverse conditions can very often be mitigated by the clearing of additional cropland within the existing unit. The chief care is to insure that areas selected for clearing have soil of sufficient depth and quality to permit satisfactory crop yields. Since the deepest soils usually have the largest stumps and are, therefore, more difficult to clear, there is a tendency to clear the poorer soils in preference to those that are really suitable. Type III areas in southwestern Oregon are situated in narrow foothill valleys. There is little possibility for extension of cultivable acreage, but the size of operating units can, to some extent, be increased by seeding adjacent cut-over upland areas in grass to be used as pasture for sheep and cattle.

The north Idaho situation is somewhat akin to that of western Washington, with the exception that some improvements may be accomplished through small irrigation works. Flood control and drainage would also benefit parts of the area.

Conditions in western Montana have not been portrayed on a comparable map. It is known, however, that Type III areas are extensive in the basin of the Flathead River and in Sanders County, which lies between Glacier National Park and the tip of northern Idaho. Periodic shortages of irrigation water are also common in the Bitterroot Valley. Land-use problems in all of western Montana have been greatly intensified by the influx of large numbers of drouth refugees from the Northern Great Plains.

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[15] The following discussion of problem areas is drawn from a special unpublished memorandum prepared for the Pacific Northwest Regional Planning Commission by Leland N. Fryer, regional farm management supervisor, Farm Security Administration, Region XI, Portland, Oregon.

PRESENT AND PROSPECTIVE PRESSURE ON AGRICULTURAL LANDS

The existence of land-use problem areas briefly discussed above is one evidence of pressure on the existing supply of good agricultural lands. Farmers do not, as a rule, choose to use poor or ill-adapted lands if good land is available to them.

Internal Pressures

The pressure now existing arises from both internal and external causes. The internal causes include, first, a strictly limited area that is suited for permanent crop production. Limitations of rainfall, rough topography, inferior soils, short growing season are the principal factors that must be contended with on most of the lands lying east of the Cascade Range. Extension of cultivation beyond its present limits without irrigation or some other form of land improvement is a hazardous venture, involving heavy losses to most individuals who try it and heavy costs to the community, which must provide roads and schools for the ill-fated adventurers and perhaps salvage the wreckage left behind by those who fail. To reduce this waste in natural and human resources, a twofold program of preventive action is needed—measures to discourage the settlement of areas that are fundamentally unsuitable for farming and the systematic improvement of those areas that can be made to sustain a permanent agricultural settlement. In the area west of the Cascade Range, the physical limitations are not so clearly discernible. Abundant rainfall gives

valuable to the region and the Nation as the general expansion of the agricultural economy.[15]

The Type I problem areas indicated on the map by solid black contain, for the most part, submarginal wheat lands. In most of the area rainfall is insufficient to assure any reasonably stable production. Even with the practice of alternate-year fallowing, the average yield is less than twelve bushels per acre—six bushels on the annual basis. The periodic crop failures have resulted in farm abandonment, deterioration of buildings, fences, and roads. Soil erosion by wind and water has done considerable damage. Rehabilitation, except in those favored sections where irrigation is feasible, will require that much of the land be returned to grass and that cash grain farming be replaced with range livestock or similar extensive use.

Type II problem areas contain the so-called "shoestring valleys" and "stump ranches" that fringe the forest lands. In most cases a very limited acreage is available for cultivation in the narrow valley floor. If the slopes are cleared for cultivation, erosion at once becomes a problem. Schools and roads are extremely high in cost and both are poor in quality. In many of these areas there is opportunity for supplemental off-the-farm employment in the forests and in providing recreational services. Where opportunity exists for a stabilized farm-forest economy of this type, it might well become an asset and should be encouraged. In other parts the existing well-located farm units may be expanded to a more economic size by additional clearing. As a general rule, however, the lands in this area are not well suited to agriculture. Much care should be taken to insure that further settlement be confined to the better and more accessible parts. A considerable part of the lands now in farms should go back to forest. Limited areas may be suitable for grazing if practicable methods can be devised to keep down the growth of brush.

Type III areas are those that contain a heavy concentration of farms too small to provide the operator's family with an adequate living. In the western Washington section these adverse conditions can very often be mitigated by the clearing of additional cropland within the existing unit. The chief care is to insure that areas selected for clearing have soil of sufficient depth and quality to permit satisfactory crop yields. Since the deepest soils usually have the largest stumps and are, therefore, more difficult to clear, there is a tendency to clear the poorer soils in preference to those that are really suitable. Type III areas in southwestern Oregon are situated in narrow foothill valleys. There is little possibility for extension of cultivable acreage, but the size of operating units can, to some extent, be increased by seeding adjacent cut-over upland areas in grass to be used as pasture for sheep and cattle.

The north Idaho situation is somewhat akin to that of western Washington, with the exception that some improvements may be accomplished through small irrigation works. Flood control and drainage would also benefit parts of the area.

Conditions in western Montana have not been portrayed on a comparable map. It is known, however, that Type III areas are extensive in the basin of the Flathead River and in Sanders County, which lies between Glacier National Park and the tip of northern Idaho. Periodic shortages of irrigation water are also common in the Bitterroot Valley. Land-use problems in all of western Montana have been greatly intensified by the influx of large numbers of drouth refugees from the Northern Great Plains.

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[15] The following discussion of problem areas is drawn from a special unpublished memorandum prepared for the Pacific Northwest Regional Planning Commission by Leland N. Fryer, regional farm management supervisor, Farm Security Administration, Region XI, Portland, Oregon.

PRESENT AND PROSPECTIVE PRESSURE ON AGRICULTURAL LANDS

The existence of land-use problem areas briefly discussed above is one evidence of pressure on the existing supply of good agricultural lands. Farmers do not, as a rule, choose to use poor or ill-adapted lands if good land is available to them.

Internal Pressures

The pressure now existing arises from both internal and external causes. The internal causes include, first, a strictly limited area that is suited for permanent crop production. Limitations of rainfall, rough topography, inferior soils, short growing season are the principal factors that must be contended with on most of the lands lying east of the Cascade Range. Extension of cultivation beyond its present limits without irrigation or some other form of land improvement is a hazardous venture, involving heavy losses to most individuals who try it and heavy costs to the community, which must provide roads and schools for the ill-fated adventurers and perhaps salvage the wreckage left behind by those who fail. To reduce this waste in natural and human resources, a twofold program of preventive action is needed—measures to discourage the settlement of areas that are fundamentally unsuitable for farming and the systematic improvement of those areas that can be made to sustain a permanent agricultural settlement. In the area west of the Cascade Range, the physical limitations are not so clearly discernible. Abundant rainfall gives the country a luxuriant appearance that is often deceiving to the inexperienced person. The large annual precipitation makes it very difficult to cultivate steeply sloping lands without inducing accelerated water erosion which moves the topsoil down the creeks. Thousands of acres in the valley floors are inadequately drained. Other areas are heavy clay which is difficult to work. Some parts of this section are subject to recurring floods. A considerable part of the best lands still available are covered with large stumps that can be removed only at great expense and labor.

The second cause of internal pressure comes from the fairly large natural increase of the farm population. In Idaho and Montana, especially, the population is predominantly on the farms or in the small towns that serve farming communities. The net reproduction rate of the Idaho population (128) as of 1940 was exceeded only by three States of the Union.[16] The net reproduction rate for the State of Montana declined from 124 in 1930 to 109 in 1940. Even so, there is still a considerable increase of the farm-born population in the face of continuously shrinking cropland areas. Net reproduction rates for the Oregon and Washington population as a whole are considerably below replacement level (Oregon 87, Washington 91).[17] Despite the very low over-all rate for the two coast States, the farm population net reproduction rate was in the neighborhood of 108.[18] The data above cited show that there is a large excess of farm young people who must seek opportunity elsewhere. This condition is probably not to be deplored, since the cities need a continuous influx of rural people. In times of restricted industrial employment, however, the tide of farm youngsters is dammed up, and increased pressure on the land resources inevitably results. This tendency was particularly evident throughout the 1930's, and it is likely to recur when war activity begins to slacken.

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[16] These included Utah, New Mexico, and Arizona. U. S. Census Bureau: Releases Series P–5a, "Population Characteristics 1940."

[17] *Ibid.* A reproduction rate of 100 is necessary to maintain population at a constant level.

[18] Rate for the three coast States, Washington, Oregon, California.

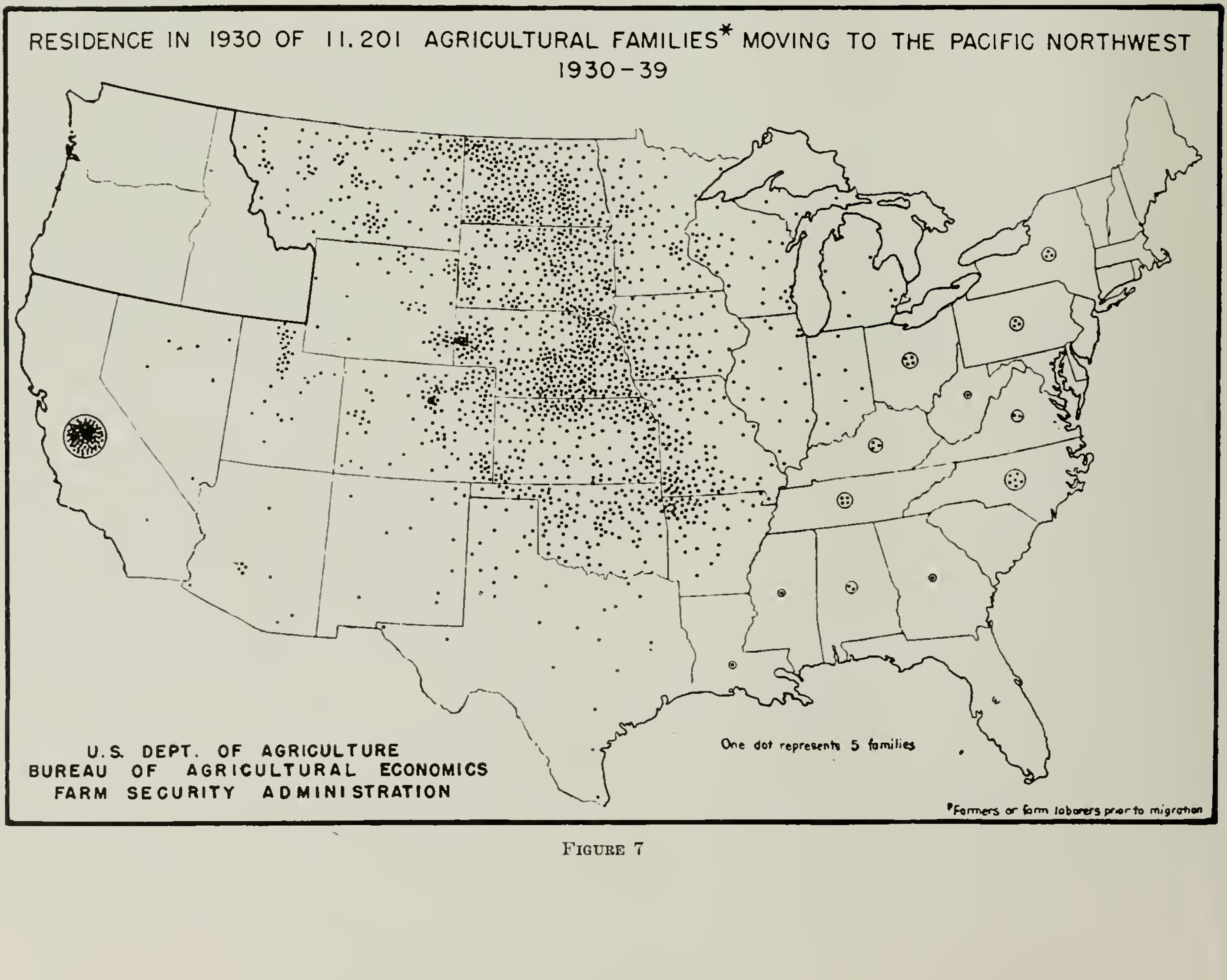
RESIDENCE IN 1930 OF 11,201 AGRICULTURAL FAMILIES* MOVING TO THE PACIFIC NORTHWEST 1930–39
One dot represents 5 families
U.S. DEPT. OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS
FARM SECURITY ADMINISTRATION
*Farmers or farm laborers prior to migration

FIGURE 7

The third pressure has resulted from the depletion of timber resources in numerous forest areas and the attendant recession or removal of forest industries that formerly had provided a major source of income to local rural and urban communities.

The fourth type of pressure—not peculiar to the Pacific Northwest but almost universal throughout the country—stems from the continued depletion of the soil through accelerated erosion. In this respect the uncultivated range lands have suffered along with the croplands. Quantitative estimates of the total damage wrought by the various types of erosion are as yet very tentative. It is, however, possible to give some clue to the damage done in sections where measurement data have been collected. Dr. Hugh Bennett[19] has summarized the estimated extent of erosion damage in the Palouse section and in the mid-Columbia area of central and north-central Oregon (table 4).

According to these reconnaissance survey estimates, about one-half of the croplands in these two important wheat-raising areas have lost half or more of their topsoil. Erosion damage to croplands elsewhere in the region (except in certain smaller areas) is much less critical. On the range lands, however, the damage noted in the Palouse and mid-Columbia is fairly typical of all grazing lands east of the Cascade Range. Many constructive steps have recently been taken to improve the condition of range lands and to check deterioration of the forage cover that protects the soil.

External Pressure

The most important external pressure on Pacific Northwest agricultural lands has its origin in the fundamental land-use maladjustment that exists in the Great Plains region. Studies made by the Bureau of Agricultural Economics and the Farm Security Administration show that large numbers of farm families moved from the Great Plains States to the Pacific Northwest in the 1930–40 decade. Through an enumeration of the children of these families who were attending public schools in Washington, Oregon, and Idaho, it was possible to locate the 1930 residence of some 11,200 families who had previously been farmers or farm laborers. Figure 7 shows the location of the areas from whence these people came.

The total movement of farm population into the Pacific Northwest was, of course, two or perhaps three times the number that were traced by this enumeration. It is generally conceded that the exodus of farm population from the Great Plains is likely to be fairly continuous over a long period of adjustment, with heavy surges in the movement following the drought periods that are certain to recur.[20]

TABLE 4.—*Estimated extent of erosion damage in Palouse and mid-Columbia areas of Washington and Oregon*

Type of erosion	Percent of land affected	
	Cultivated	Pasture
Palouse:		
Mainly sheet erosion:		
Slightly damaged—less than one-fourth topsoil lost	10	50
Moderately damaged—about one-fourth topsoil lost	10	25
Seriously damaged—about half topsoil lost	35	5
Severely damaged—more than half topsoil lost	25	3
Affected by gullying:		
Moderately to severely damaged	30	40
Affected by wind erosion:		
Moderately to severely affected by removal or deposition	40	35
Mid-Columbia:		
Water erosion:		
Slightly damaged	13	40
Moderately damaged	25	20
Seriously damaged	25	20
Severely damaged	25	10
Wind erosion:		
Area affected	61	42

SOURCE: H. H. Bennett, *Soil Conservation*, McGraw Hill Co., 1939, pp. 823 and 827.

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[19] Chief of Soil Conservation Service, U. S. Department of Agriculture.

[20] Summing up the results of its study in 1936, the President's Great Plains Drought Area Committee said: "The fact that even the relatively small population of the Great Plains cannot be sustained adequately under present conditions has ben demonstrated in recent drought years. The explanation lies as much in unwise land use as in climatic and other natural conditions. In part the misuse of land has grown out of the history of settlement in the Region, in part it derives from an attempt to apply a technique of land development not suitable for conditions in the Great Plains." *Future of the Great Plains,* Report of the Great Plains Committee, 1937, p. 39.

THE COOPERATIVE LAND INVENTORY: SUMMARY OF FINDINGS AND RECOMMENDATIONS

Appreciating the long-term significance of the so-called "migration problem" and the practical certainty that farm population will continue to enter the Pacific Northwest at various rates for several decades, the Pacific Northwest Regional Planning Commission and its Land Advisory Committee saw the need for a region-wide inventory of lands potentially available for agricultural use. Without a well-conceived program for the development of good lands that need irrigation, clearing, and drainage, there will inevitably be continued settlement in submarginal areas, to the ultimate disadvantage of both the settler and the community. The first step in such a comprehensive land program obviously required a knowledge of all reasonably meritorious proposals heretofore made for the development of additional croplands and a systematic review and classification of these proposals according to their present status and apparent feasibility. It seemed advisable to map the location and extent of the areas proposed for development and to prepare tabular summaries of the more essential data by projects, by counties, by subregions, and for the region as a whole. At the same time it was possible to obtain local and technical opinion concerning the type of farming and size of farm best adapted to each project area. Having decided, in the course of the deliberations of the Regional Planning Commission and the Land Advisory Committee, upon the general scope and method of such an inventory, the Bureau of Agricultural Economics and the National Resources Planning Board entered into a cooperative agreement and assigned personnel from their respective regional offices to carry through the inventory. The results of this cooperative effort are contained in sections 2 and 3 of this report. The findings of the cooperative inventory, and the recommendations of the Pacific Northwest Regional Planning Commission based thereon are here stated.

Findings[21]

1. Land-development projects definitely under way or in sight at the present time contain nearly 2.5 million acres. Of this total, some 2 million acres are scheduled for irrigation, 40 thousand acres are to be drained, and about 435 thousand acres are to be cleared. About 17 thousand acres will require some combination of irrigation, drainage, and clearing. Of the 2.5 million acres, about one-third (815 thousand acres) will be developed primarily to benefit existing farms. The other two-thirds will be available for about 21 thousand new farms.

2. The total area included in development proposals that merit serious consideration and further economic and engineering investigations embraces about 3.6 million acres. Of this total area, over 3.2 million acres need irrigation as the primary improvement, about 357 thousand acres need clearing, and 69 thousand need drainage. About 658 thousand acres apparently call for a combination of 2 or more types of treatment. Of the total acreage included in proposals of this class, 2.7 million acres are associated with existing farms and would be developed primarily to improve the productive capacity of these units. About 1 million acres (if all proposals should become feasible) would be available for new farms. Local and technical opinion on type and size of farms best adapted to the various listed areas indicates that the million acres might provide about 13 thousand new farm units.

3. About 2.4 million acres are included in proposals within the deferred class.[22] Some of this area may, in time, be developed for crop use, but on the basis of present conditions, there appear to be serious obstacles in the way of its development.

4. Summarizing the results of the inventory as they bear upon new settlement opportunity, it is concluded that the immediate prospects for settlement on full-time, family-size farms add up to about 21 thousand new units. Reasonable expectations under existing economic conditions would justify an estimate of potential expansion sufficient to provide a total of about 34 thousand new farm units of commercial character. Adding remote possibilities to this figure gives, according to present estimates, an ultimate "ceiling" for existing types of commercial agriculture of about 49 thousand new units.

Recommendations of the Regional Planning Commission

It is recommended:

1. That fully investigated land-development projects be scheduled, constructed, and put into operation as rapidly as practicable with due regard: (1) to regional and national markets for agricultural products; (2) to prior claims of national defense upon materials, transportation, and skilled labor; and (3) to the opportunities for gearing land development to an employment-stabilization program.

2. That funds be provided,[23] without delay, to the various authorized Federal and State agencies for the purpose of cooperatively carrying out the technical investigations necessary for determining the economic and engineering feasibility of a substantial portion of the most promising and most needed proposals not already fully investigated. That plans and specifications and engineering and legal work necessary before construction can be initiated be completed for those projects deemed most needed and most feasible. That advance authorizations and other suitable financial arrangements be made by the Congress and by the States to permit a well-conceived construction program to go into action as the need for employment may arise as and when war employment is tapering off.

3. That a region-wide study be made to determine the types of farm economy most likely to have a stabilized market. That the current agricultural market studies of the Columbia Basin Joint Investigations be used as a point of departure in a continuing investigation applicable to the entire region.

4. That the basic principles corresponding to those of the Federal Reclamation Act, as amended, be applied

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[21] See table 5, p. 33.

[22] All proposals have been classified into primary, secondary, and deferred categories (Classes A, B, and C respectively) as defined under "Classification of Proposals," page 37.

[23] These funds might be allocated from a special surveys and planning revolving fund, as recommended by the National Resources Planning Board.

insofar as practicable to the reclamation of lands by means other than irrigation. That a suitable agency of the Federal Government be authorized and directed to make preliminary surveys and investigations to determine the areas in which desirable clearing and drainage-reclamation operations could advantageously be organized on a project basis under governmental or cooperative sponsorship.

5. That the National Resources Planning Board initiate a thorough review of all Federal legislation pertaining to land reclamation with the object of developing greater uniformity and consistency of Federal policy with regard to the role of the Federal Government in various types of land development. That exploration be made to develop a more equitable and adaptable plan of repayment for the various types of land reclamation.

6. That farm forestry be advanced by woodland acquisition, aids in woodland ground preparation and management, and improvement of marketing facilities for farm-forest products. That research and extension in this field be adequately financed by State and Federal funds. That through legislation a county forester organization be established in the Extension Service to be financed on a 50–50 basis by the State and Federal Governments.

7. That an adequate program be devised to increase the efficiency of new farm units in the first years of occupancy. That suitable long-term, low-interest loans and other types of assistance be made available to capable settlers who need it for the necessary farm organization expense[24] required to bring the farm into full production.

8. That the investigation of publicly financed development areas include a quantitative and qualitative determination of benefits and beneficiaries and that costs of reclamation be apportioned accordingly.

9. That the soil survey, the survey of surface water and ground-water supplies, the various types of topographic mapping, the land-cover surveys, the land-use capability surveys, and similar technical investigations be coordinated and applied in areas that have not yet adequately been covered but which appear worthy.

10. That concurrent with the land-development program there be maintained a vigorous program of conservation. That every practicable means, including the retirement of submarginal land, be employed to improve land-use practice and to encourage adjustments that will conserve and improve the soil. That systematic efforts be continued to cut down present wastes of irrigation water and to promote its more efficient use. That water-conservation projects, both large and small, be further developed in a well-coordinated program, which recognizes the various fundamental priorities in the uses of water and the economic advantages of multiple use. That coordinated water planning on a drainage-basin basis be continued and strengthened.

11. That land-development planning be paralleled by planning for the construction of auxiliary works and facilities needed as a result of the increased settlement. That the necessary facilities for ancillary industrial development and for the essential services be planned in conjunction with the land development.

12. That general planning for development, selection of settlers, and settlement as devised in the Columbia Basin Joint Investigations be adopted, refined, and further employed in other important reclamation project areas.

The Regional Planning Commission reemphasizes its belief in the need for continuous attention to the difficult problems of providing guidance to new settlers, discouraging the occupation of unsuitable lands, improving the standard of living and economic security of migratory agricultural laborers, and providing for the relief of distressed nonresident families. Attention is therefore directed to the recommendations that the Commission offered in its 1939 report *Migration and the Development of Economic Opportunity in the Pacific Northwest*.[25] The Commission also agrees in principle with the land policy recommendations of the National Resources Planning Board as set forth in its recent report *Development of Resources and Stabilization of Employment in the United States, Part III*.

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[24] The more obvious of these include the expense of buildings and other farmstead facilities, wells, fences, ditches, and leveling; machinery and other equipment, livestock, feed and seed; household equipment, family clothing and subsistence, and necessary medical and dental services.

[25] See also Part I, this report.

PART II

2. INVENTORY AND APPRAISAL OF LAND DEVELOPMENT PROPOSALS*

ACKNOWLEDGMENTS

An inventory, by its very nature, requires the collection of relevant information from all available sources. Agencies, both Federal and State, concerned with land development supplied the major part of the information used in this study. The following deserve special mention for invaluable assistance in providing information and advice: United States Department of Agriculture, Farm Credit Administration, Farm Security Administration, Soil Conservation Service, Forest Service; United States Department of the Interior, Bureau of Reclamation, Bonneville Power Administration, Geological Survey, Oregon and California Revested Lands Administration, Office of Indian Affairs; United States Department of War, Corps of Engineers; State of Idaho, Department of Reclamation, State Planning Board, University of Idaho, State Agricultural Experiment Station, State Agricultural Extension Service; State of Montana, State Water Conservation Board, State Planning Board, Montana State College, State Agricultural Experiment Station, State Agricultural Extension Service; State of Oregon, State Reclamation Commission, Oregon State College, State Agricultural Experiment Station, State Agricultural Extension Service; State of Washington, Department of Conservation and Development, State Planning Council, Washington State College, State Agricultural Experiment Station, State Agricultural Extension Service.

Acknowledgment is also due the several individuals who have contributed to the study. The work was supervised and guided on the part of the Bureau of Agricultural Economics by H. E. Selby, Roscoe E. Bell, Rex E. Willard, J. J. Haggerty, and their representatives, and on the part of the National Resources Planning Board by R. F. Bessey and J. C. Rettie. In carrying forward the work special assistance was furnished on many phases by Carl Tjerandsen, Ray B. Haight, J. C. Moore, and Edwin F. Landerholm, State Representatives of the Bureau of Agricultural Economics for Idaho, Montana, Oregon, and Washington, respectively. Special information concerning land development was also furnished by James Spofford and E. V. Berg, former and present Commissioners of Reclamation, State of Idaho; by Fred E. Buck, Secretary, Montana State Water Conservation Board; by Charles E. Stricklin, State Engineer of Oregon; and by Charles Bartholet, Supervisor, Division of Hydraulics and Water Resources, Washington State Department of Conservation and Development.

For those counties where maps, reports, and recommendations have been prepared by the County Agricultural Land Use Planning Program cooperatively carried on by the Bureau of Agricultural Economics, State colleges and local committees of farmers, these materials have been available for use in this study and have proved to be of particular value in determining areas suitable for development by clearing which have heretofore been unmapped and undescribed. For those portions of drainage basins where reconnaissance surveys of existing and potential irrigation have been completed by the Bureau of Reclamation, they have been made available and likewise have proved to be valuable contributions.

Special acknowledgment is due the agricultural extension services of the respective State colleges for their part in arranging conferences with county agricultural agents, and through them with other informed local persons such as Farm Security supervisors, Farm Credit Administration officials, and Soil Conservation Service representatives. Grateful appreciation is also expressed to members of the Land Advisory Committee and to the numerous other persons who have contributed information and advice.

The maps were prepared in the regional office of the National Resources Planning Board by Robert A. Miller, under the supervision of Thomas H. Elliott.

Clerical assistance was provided in a large measure by the Work Projects Administration under Oregon project 3061 and by the regional office of the Planning Board.

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*By Gilbert G. Stamm, Associate Agricultural Economist, Bureau of Agricultural Economics and Vincent M. Throop, Associate Geographer, National Resources Planning Board. A joint study by the Bureau of Agricultural Economics, U. S. Department of Agriculture and the National Resources Planning Board, Region 9; 1940–41.

INTRODUCTION

As one of several related studies designed to provide the basis for an internal improvement plan for the Pacific Northwest, the following report presents some possibilities for agricultural land development. This inventory and appraisal, initiated late in 1939 by the National Resources Planning Board, was carried forward cooperatively after June 1940 as a joint study by the Bureau of Agricultural Economics and the National Resources Planning Board.

The immediate objectives of the study are three. The first is to compile an inventory of the acreage, location, and pertinent characteristics of lands proposed for development by irrigation, drainage, and clearing in the three States of Idaho, Oregon, and Washington, and in the 19 western counties of Montana[1] and, concurrently, to ascertain the probable type, size, and number of new farms to result from the development of such proposals. A second objective is to classify the land-development proposals according to adequacy of investigation and, in the light of present conditions, their merit for construction or further investigation. A third objective is to ascertain the location and areal extent of existing irrigation, drainage, and diking developments. The methods used to achieve these objectives are briefly described below.

To meet the first objective, proposals and investigational reports by responsible agencies were examined. The data concerning proposals in each county were assembled on schedules and maps. With the information in hand, opinions and knowledge of locally competent persons were sought to verify and supplement the recorded data. Through the cooperation of the State agricultural college extension services, conferences were arranged with county agricultural agents, and through them with other competent persons, such as the Farm Security Administration supervisors, Farm Loan Association secretaries, and, in some cases, other interested persons. At these conferences the proposals were checked and estimates of the type, size, and number of new family farms that might be developed under present conditions were discussed.

With respect to the second objective, it is recognized that an attempt to determine feasibility of the proposals on the basis of available data, most of which does not go beyond information yielded by reconnaissance surveys, would prove of little value. Thus the system of classification used in the study is one devised to indicate the degree of investigation of the proposals and their relative desirability for further detailed investigation. This method, more fully described in a subsequent section, was chosen because it is recognized that the economic feasibility of land development and reclamation cannot be accurately estimated without thorough and detailed investigation.

In general, the classification recognizes three groups

TABLE 5.—*Pacific Northwest region—Summary of proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	8,669,077 [3] (786,893)	4,229,020 (599,405)	4,440,057 (187,488)	49,452 (170)
Class A	2,485,217 (17,270)	814,689 (11,680)	1,670,528 (5,590)	21,139
Class B	3,672,227 (658,063)	2,695,891 (525,785)	976,408 (132,278)	12,945 (170)
Class C	2,406,383 (71,560)	695,262 (51,940)	1,711,121 (19,620)	14,548
Unclassified	105,250 (40,000)	23,250 (10,000)	82,000 (30,000)	820
IRRIGATION				
Total irrigation	7,537,411 (78,200)	3,591,250 (48,700)	3,946,161 (29,500)	43,079
Class A1	1,519,592	121,172	1,398,420	17,749
Class A2	490,062 (2,200)	423,012 (2,200)	67,050	722
Class B1	2,409,341	1,956,551	452,790	6,474
Class B2	836,827 (28,000)	505,867 (16,500)	330,960 (11,500)	3,892
Class C1	1,528,651	323,360	1,205,291	10,772
Class C2	308,938 (48,000)	227,288 (30,000)	81,650 (18,000)	1,050
Class C3	340,000	12,000	328,000	1,600
Unclassified	104,000	22,000	82,000	820
DRAINAGE				
Total drainage	201,005 (555,650)	84,779 (499,500)	116,226 (56,150)	1,422
Class A1	29,938 (1,500)	9,350 (1,500)	20,588	337
Class A2	10,255 (5,120)	4,105 (4,800)	6,150 (320)	155
Class B1	13,000 (470,300)	3,500 (464,300)	9,500 (6,000)	92
Class B2	55,668 (28,830)	12,860 (9,000)	42,808 (19,830)	657
Class C1	5,294	3,494	1,800	20
Class C2	71,950 (9,900)	36,730 (9,900)	35,220	147
Class C3	13,650	13,490	160	14
Unclassified	1,250 (40,000)	1,250 (10,000)	---------- (30,000)	----------
CLEARING				
Total clearing	930,661 (153,043)	552,991 (51,205)	377,670 (101,838)	4,951
Class A	435,370 (8,450)	257,050 (3,180)	178,320 (5,270)	2,176
Class B	357,391 (130,933)	217,041 (35,985)	140,350 (94,948)	1,830 (170)
Class C	137,900 (13,660)	78,900 (12,040)	59,000 (1,620)	945

[1] For detailed tabulations of projects, see appendix. The totals shown in this table are not as accurate as the figures would seem to imply since they have been derived from itemized estimates in the appendix which are of varying accuracy.

[2] For definition of various classes see p. 38.

[3] Figures in parentheses represent overlap of two or more types of development and are listed to indicate the total acres suggested for each type but are not included in totals.

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[1] The western Montana counties included are: Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, and Silver Bow.

of proposals—primary, secondary, and deferred. Primary, or Class A proposals, are those with no apparent disqualifying limitations to feasibility. Secondary, or Class B proposals, are those for which there are apparent minor limitations to feasibility or for which the limited information available does not give convincing evidence either of feasibility or the lack of it. Deferred, or Class C proposals, are those for which there are apparent major limitations to feasibility or those which have been superseded by other proposals or abandoned.

Water-right studies, stream-adjudication-records, tax studies, irrigation, drainage, and diking-district records, and reconnaissance-survey maps of Federal agencies furnished the data on the location and areal extent of existing irrigation, drainage, and diking developments. Since the nature of the available materials varied from place to place, the completed data are of varying accuracy. In the main, however, it is felt that the results are reasonably reliable.

It should, of course, be realized that the findings of current and future investigations may alter certain conclusions set forth in the report. Moreover, certain estimates—particularly the determination of types, sizes, and numbers of farms—were made on the basis of present conditions. These estimates, therefore, are susceptible to change as development proceeds over the next 30 years or more, especially as shifts occur in economic conditions or national policies. The present compilations, then, provide a preliminary but realistic appraisal which, it is hoped, will be improved and periodically revised.

The basic materials, consisting of maps, schedules, and related data will be filed in the regional offices of the National Resources Planning Board at Portland, Oreg.

SUMMARY OF LAND DEVELOPMENT PROPOSALS FOR IDAHO, OREGON, WASHINGTON, WESTERN MONTANA

Land-development proposals have been of continuing interest in the Pacific Northwest for 100 years. How much land remains that is thought suitable for development by irrigation, drainage, and clearing? Where is it located, and how many new farms might result from its development? Tentative answers to these questions are presented by the following inventory and appraisal of land-development proposals for the region as a whole and for each of 16 subregions.

A little more than 8.6 million acres[2] are involved in combined proposals of varying merit. Nearly 29 percent of the acreage appears to merit primary consideration. This group of proposals would improve twice as large an acreage for new farms as for existing farms. About 42 percent of the total acreage might well receive secondary consideration. For this group of proposals, the reverse purpose would be served, for here the acreage to benefit existing farms is nearly three times as great as that which would provide for new farms. The remaining acreage, which exceeds a quarter of the total, should receive deferred consideration and would improve land principally for new farms.

Of the three ways considered for improving the 8.6 million acres, irrigation would be necessary for 87 percent, drainage would be needed for about 2 percent, and clearing is suggested for 11 percent. Irrigation is a subordinate need in connection with other means of development for about 1 percent of the total acreage. Drainage is a subordinate need for 6 percent of the land and clearing for about 2 percent.

Development proposals include some lands in nearly every county of the Pacific Northwest, and the 49 thousand new farms that might result would be widely distributed. East of the Cascade Range, new farms would derive principally from irrigation of lands now used for dry-land farming or grazing; west of that barrier, they would result predominantly from the clearing of new lands. Somewhat less than one-half of the new farms would be developed by proposals now deemed feasible, slightly over one-quarter would be included in secondary proposals, and nearly one-third in deferred proposals. Irrigation would be the means of providing for 87 percent of the new farms; drainage would provide about 3 percent; and clearing would provide the remaining 10 percent.

Types of Land Development

To appreciate fully the relation of land development to agriculture in the Northwest, attention must be given to climate. Broadly, the whole Northwest is divided into two major climatic regions, separated by the Cascade Range. This mountain wall runs almost directly north and south through all of Oregon and Washington, broken only by the Columbia River Gorge, and exerts a decided influence on the climatic differences of the two areas.

The western region is characterized by mild temperatures, comparatively long growing seasons, and a rather high annual rainfall, ranging from a low of about 20 inches in certain localized areas to well over 100 inches in others. The average in most cropland areas is about 40 inches. Agriculture was first devel-

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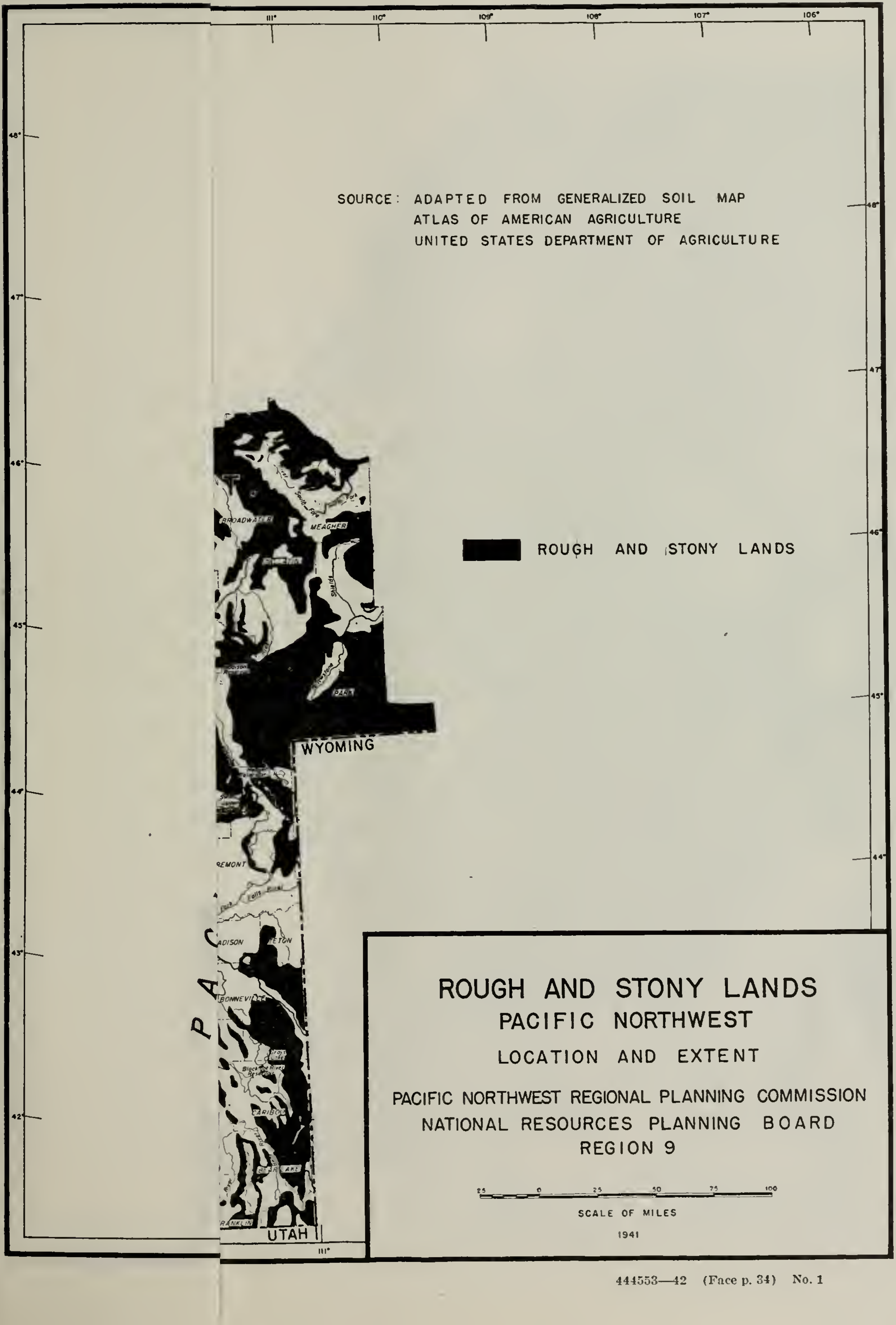
[2] See table 5 for a detailed break-down of this figure by types of development and classes of proposals.



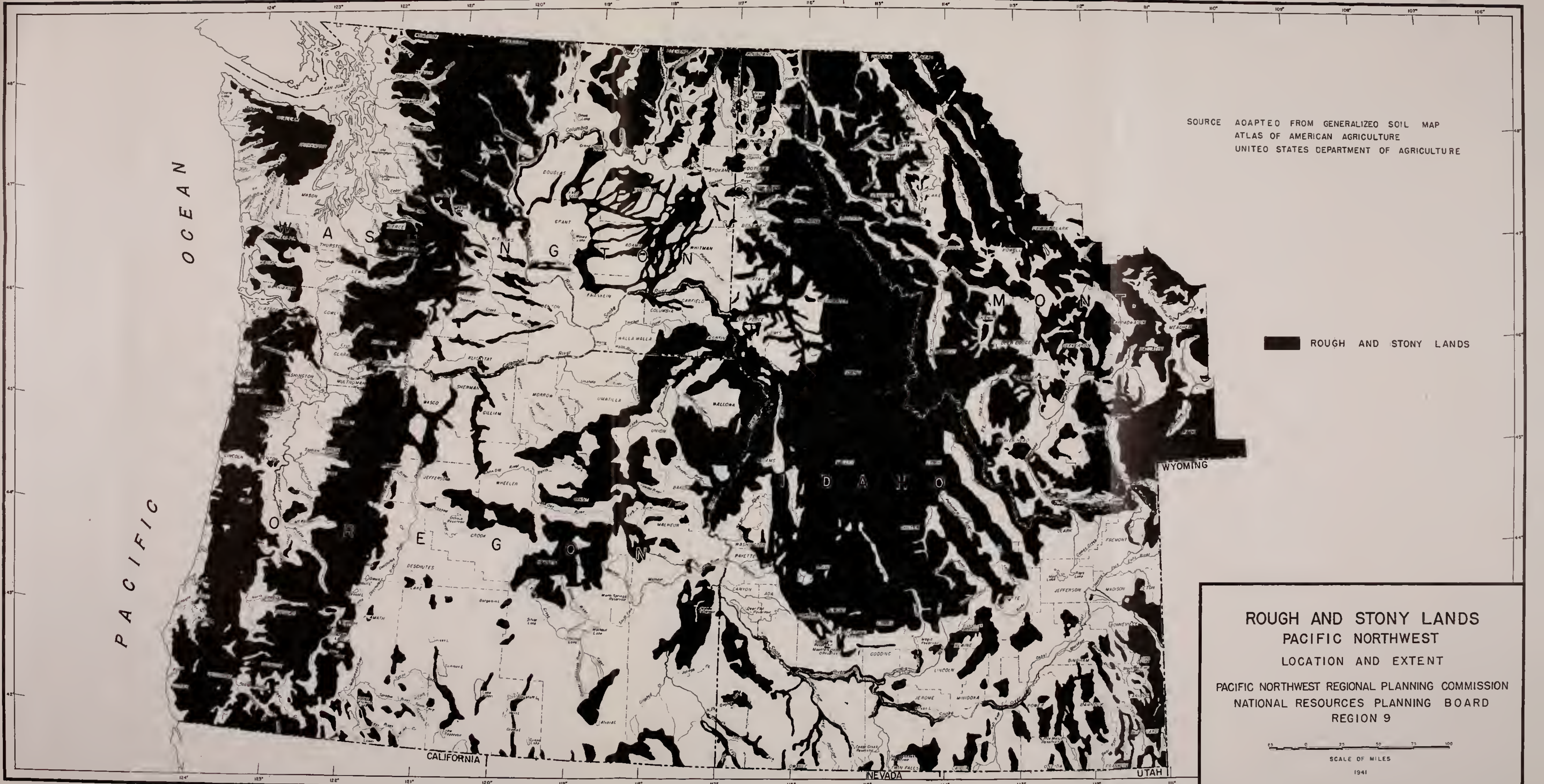
SOURCE: ADAPTED FROM GENERALIZED SOIL MAP
ATLAS OF AMERICAN AGRICULTURE
UNITED STATES DEPARTMENT OF AGRICULTURE

■ ROUGH AND STONY LANDS

ROUGH AND STONY LANDS
PACIFIC NORTHWEST
LOCATION AND EXTENT

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941



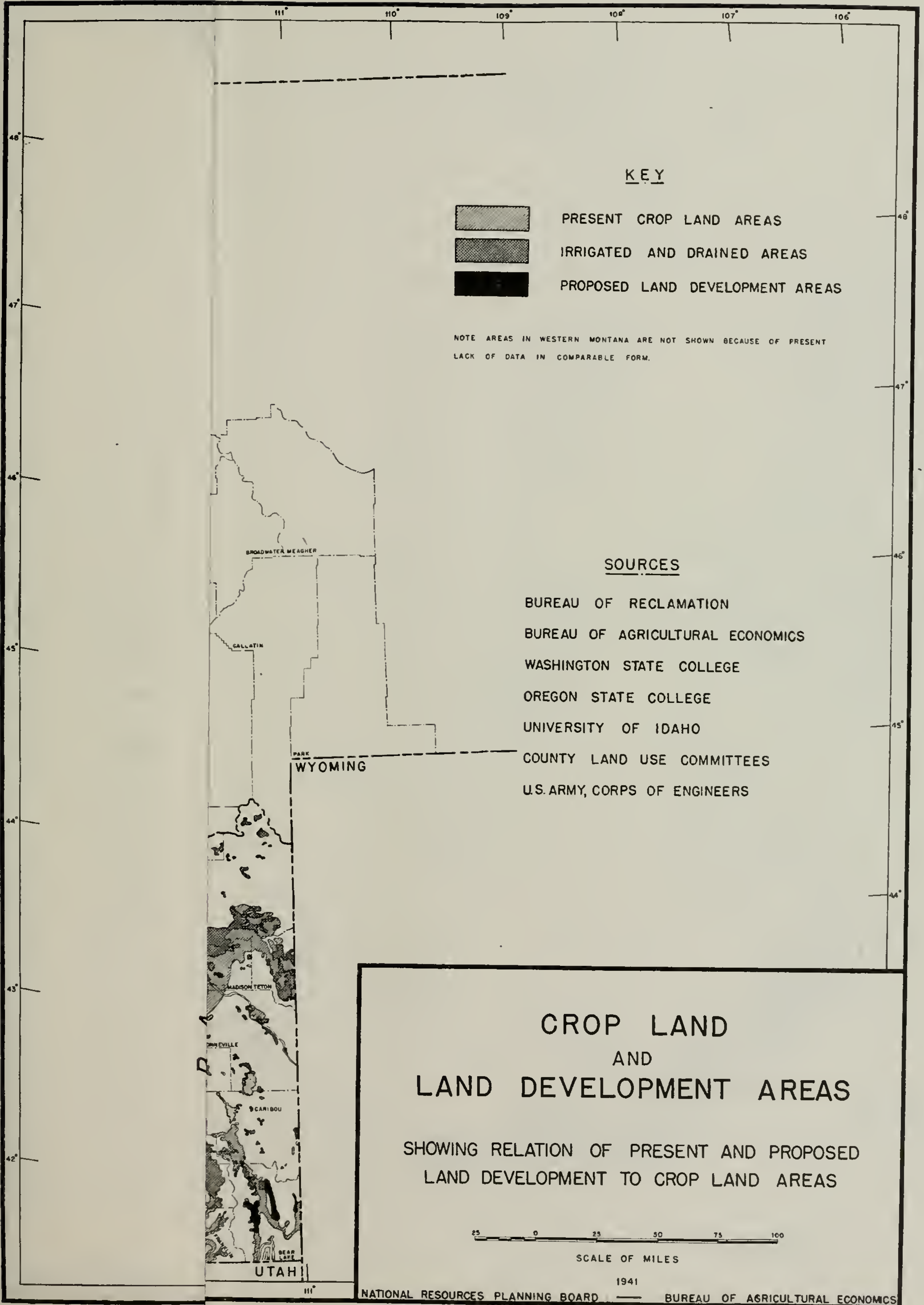
SOURCE ADAPTED FROM GENERALIZED SOIL MAP
ATLAS OF AMERICAN AGRICULTURE
UNITED STATES DEPARTMENT OF AGRICULTURE

■ ROUGH AND STONY LANDS

ROUGH AND STONY LANDS
PACIFIC NORTHWEST
LOCATION AND EXTENT

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

FIGURE 8



KEY

▨ PRESENT CROP LAND AREAS

▩ IRRIGATED AND DRAINED AREAS

■ PROPOSED LAND DEVELOPMENT AREAS

NOTE AREAS IN WESTERN MONTANA ARE NOT SHOWN BECAUSE OF PRESENT LACK OF DATA IN COMPARABLE FORM.

SOURCES

BUREAU OF RECLAMATION
BUREAU OF AGRICULTURAL ECONOMICS
WASHINGTON STATE COLLEGE
OREGON STATE COLLEGE
UNIVERSITY OF IDAHO
COUNTY LAND USE COMMITTEES
U.S. ARMY, CORPS OF ENGINEERS

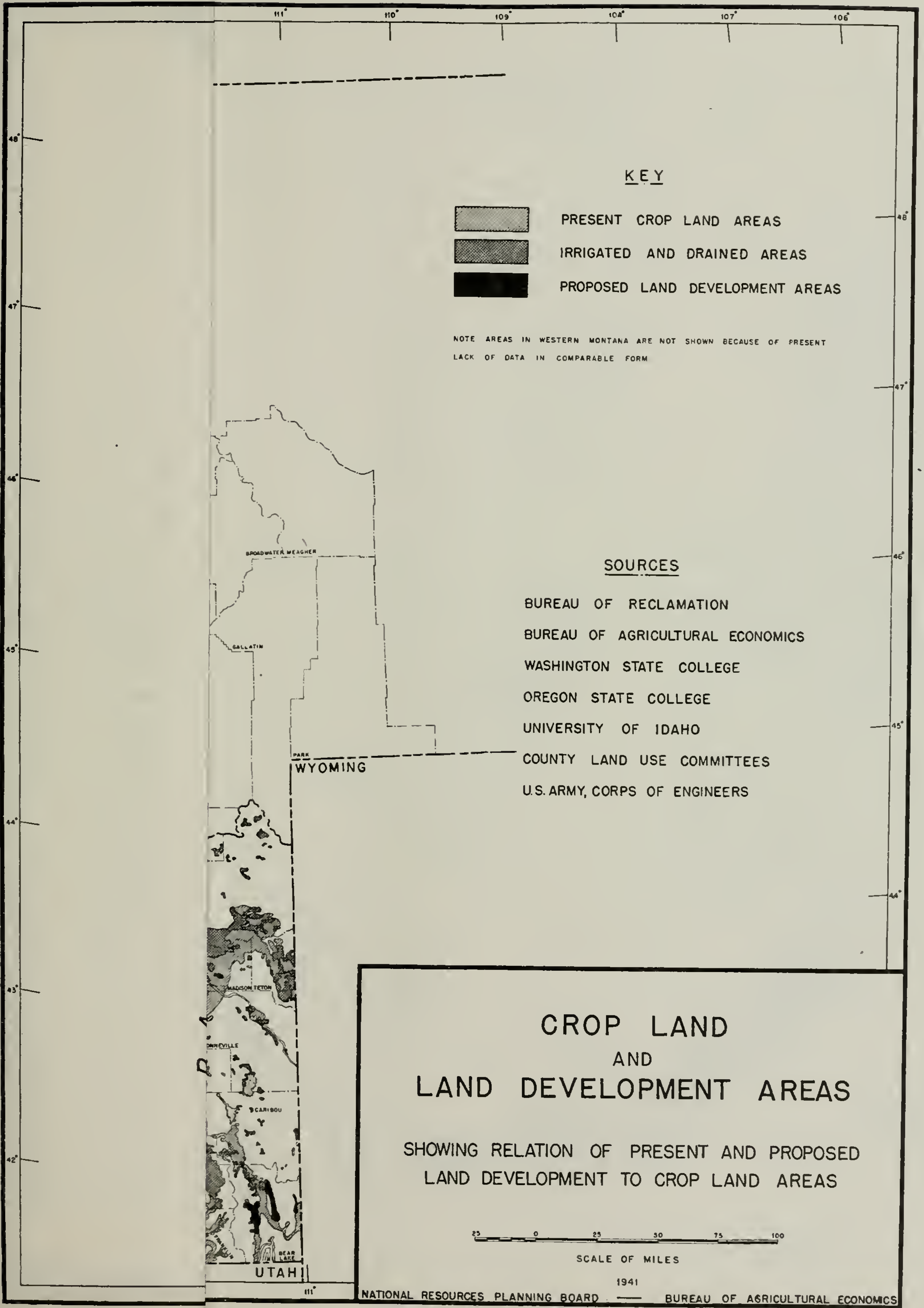
CROP LAND AND LAND DEVELOPMENT AREAS

SHOWING RELATION OF PRESENT AND PROPOSED LAND DEVELOPMENT TO CROP LAND AREAS

SCALE OF MILES

1941

NATIONAL RESOURCES PLANNING BOARD — BUREAU OF AGRICULTURAL ECONOMICS



KEY

- ▨ PRESENT CROP LAND AREAS
- ▨ IRRIGATED AND DRAINED AREAS
- ■ PROPOSED LAND DEVELOPMENT AREAS

NOTE AREAS IN WESTERN MONTANA ARE NOT SHOWN BECAUSE OF PRESENT LACK OF DATA IN COMPARABLE FORM

SOURCES

BUREAU OF RECLAMATION
BUREAU OF AGRICULTURAL ECONOMICS
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COUNTY LAND USE COMMITTEES
U.S. ARMY, CORPS OF ENGINEERS

CROP LAND
AND
LAND DEVELOPMENT AREAS

SHOWING RELATION OF PRESENT AND PROPOSED
LAND DEVELOPMENT TO CROP LAND AREAS

1941

NATIONAL RESOURCES PLANNING BOARD — BUREAU OF AGRICULTURAL ECONOMICS

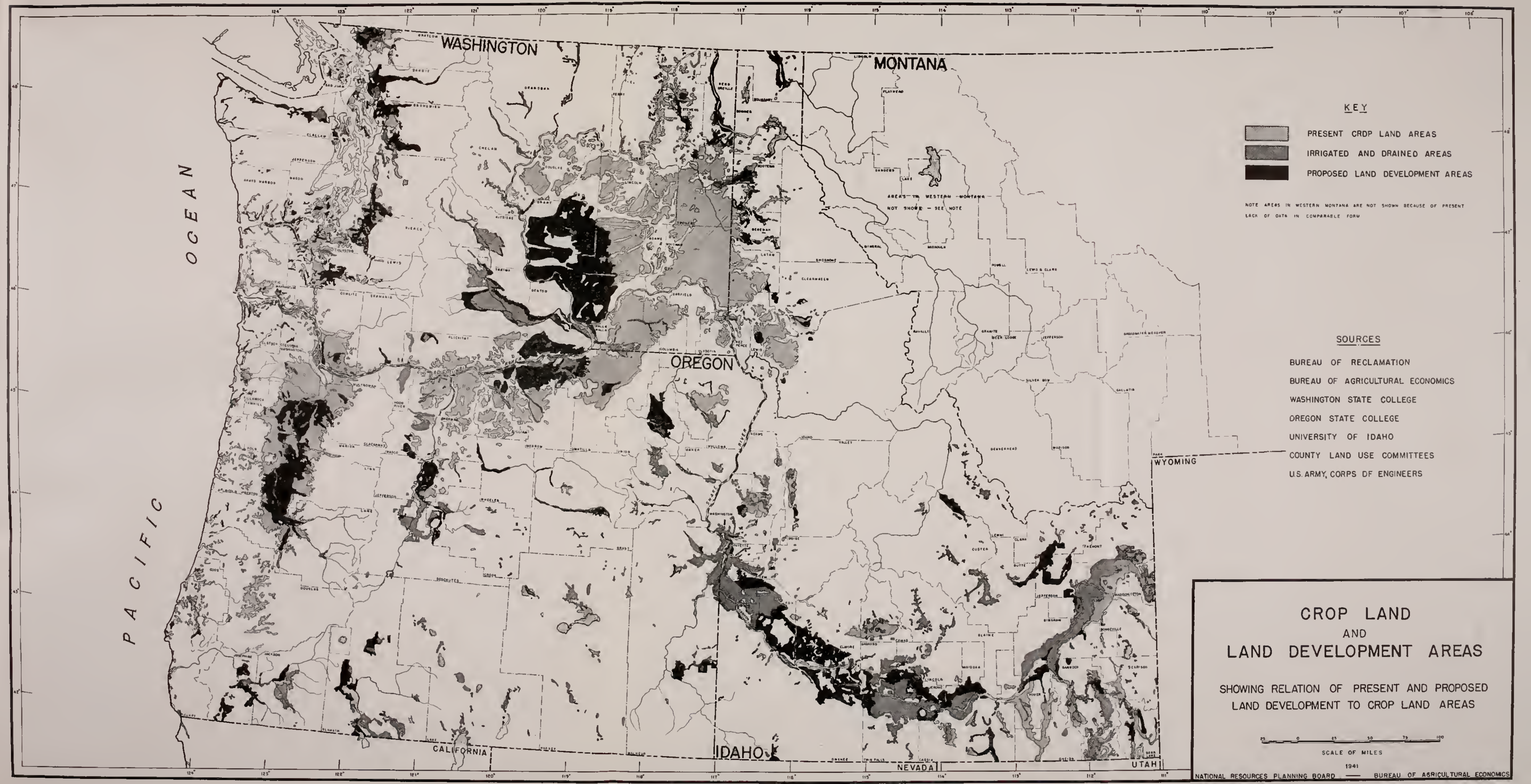
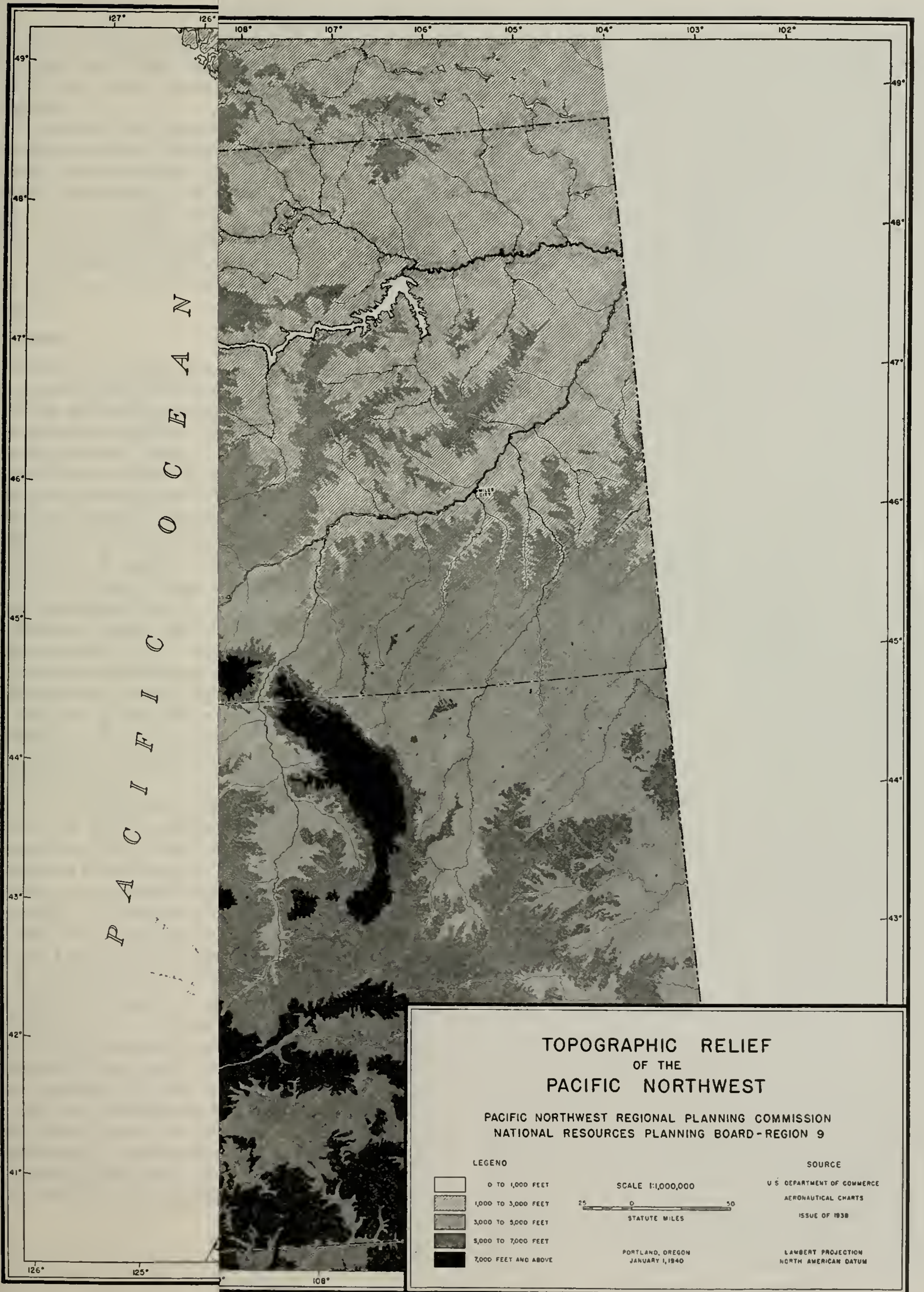

WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
CALIFORNIA
NEVADA
UTAH
PACIFIC OCEAN
KEY
PRESENT CROP LAND AREAS
IRRIGATED AND DRAINED AREAS
PROPOSED LAND DEVELOPMENT AREAS
NOTE AREAS IN WESTERN MONTANA ARE NOT SHOWN BECAUSE OF PRESENT LACK OF DATA IN COMPARABLE FORM
AREAS IN WESTERN MONTANA NOT SHOWN – SEE NOTE
SOURCES
BUREAU OF RECLAMATION
BUREAU OF AGRICULTURAL ECONOMICS
WASHINGTON STATE COLLEGE
OREGON STATE COLLEGE
UNIVERSITY OF IDAHO
COUNTY LAND USE COMMITTEES
U.S. ARMY, CORPS OF ENGINEERS
CROP LAND AND LAND DEVELOPMENT AREAS
SHOWING RELATION OF PRESENT AND PROPOSED LAND DEVELOPMENT TO CROP LAND AREAS
25 0 25 50 75 100
SCALE OF MILES
1941
NATIONAL RESOURCES PLANNING BOARD — BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 9



TOPOGRAPHIC RELIEF
OF THE
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD-REGION 9

LEGEND

☐	0 TO 1,000 FEET
▨	1,000 TO 3,000 FEET
▨	3,000 TO 5,000 FEET
▨	5,000 TO 7,000 FEET
■	7,000 FEET AND ABOVE

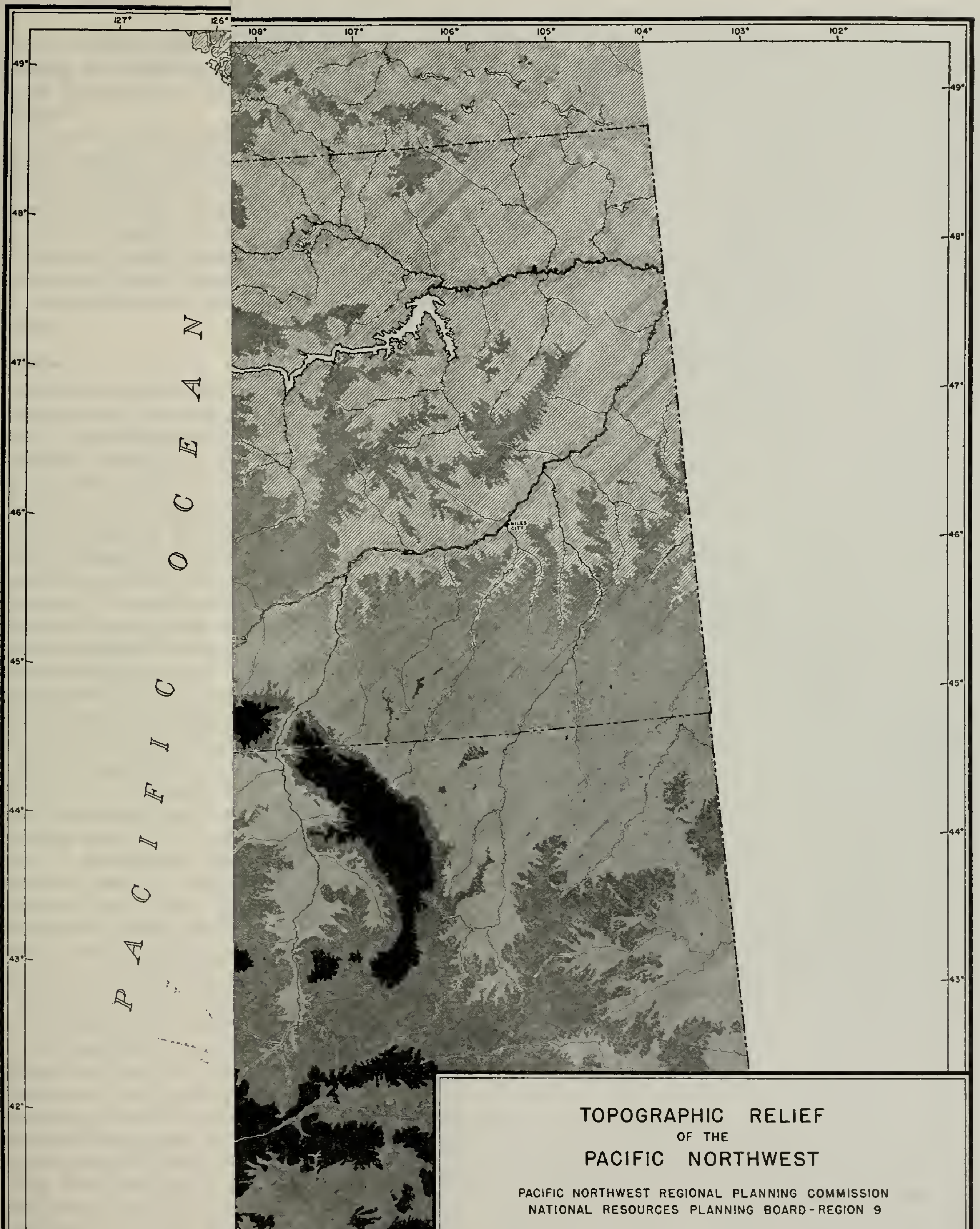
SCALE 1:1,000,000
25 0 50
STATUTE MILES

PORTLAND, OREGON
JANUARY 1, 1940

SOURCE
U S DEPARTMENT OF COMMERCE
AERONAUTICAL CHARTS
ISSUE OF 1938

LAMBERT PROJECTION
NORTH AMERICAN DATUM

444553—42 (Face p. 34) No. 3



TOPOGRAPHIC RELIEF
OF THE
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD - REGION 9

444553—42 (Face p. 34) No. 3

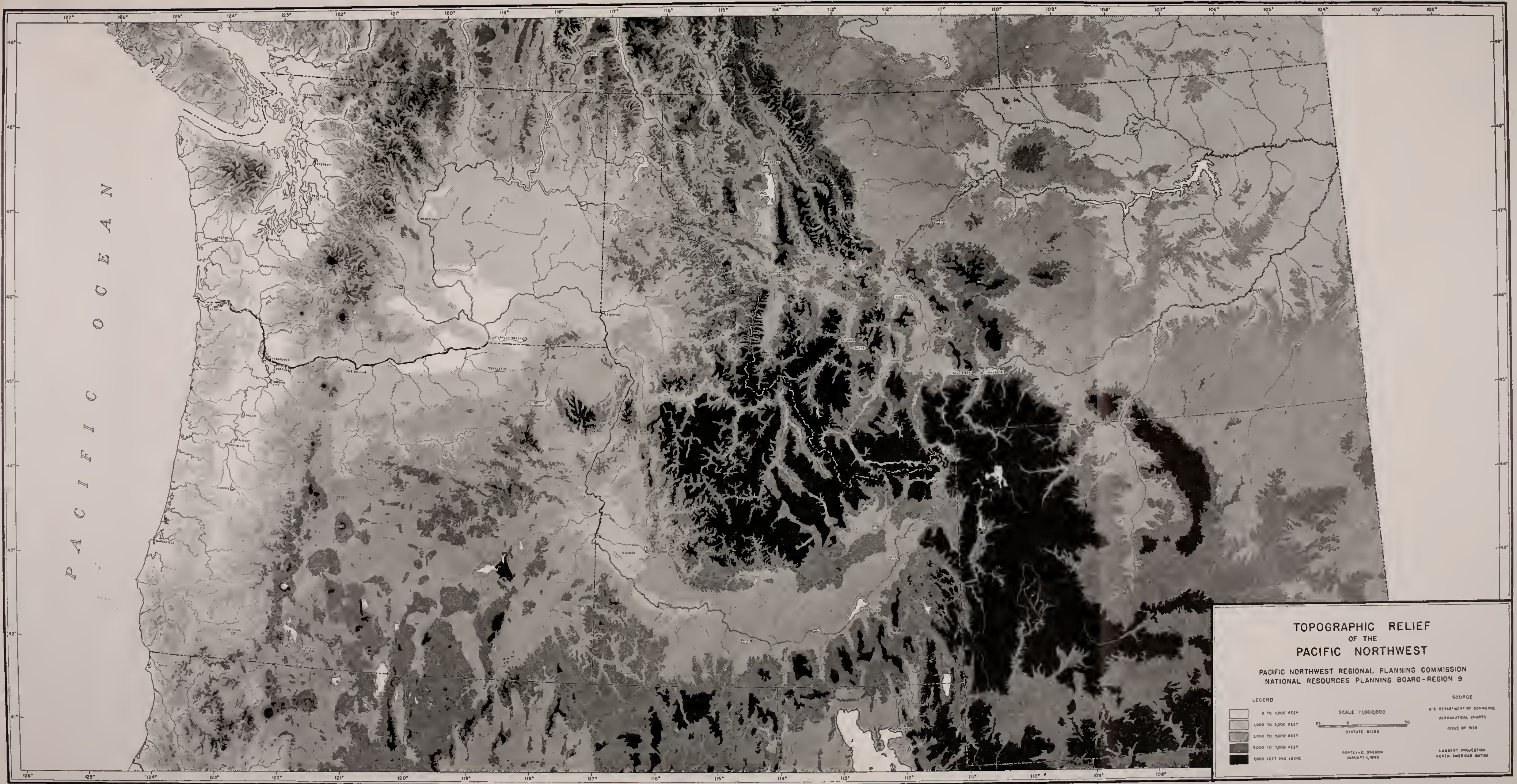

PACIFIC OCEAN
TOPOGRAPHIC RELIEF
OF THE
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARO-REGION 9
LEGEND
0 TO 1,000 FEET
1,000 TO 3,000 FEET
3,000 TO 5,000 FEET
5,000 TO 7,000 FEET
7,000 FEET AND ABOVE
SCALE 1:1,000,000
25 0 50
STATUTE MILES
PORTLAND, OREGON
JANUARY 1, 1940
SOURCE
U S DEPARTMENT OF COMMERCE
AERONAUTICAL CHARTS
ISSUE OF 1938
LAMBERT PROJECTION
NORTH AMERICAN DATUM
127° 126° 125° 124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114° 113° 112° 111° 110° 109° 108° 107° 106° 105° 104° 103° 102°
49° 48° 47° 46° 45° 44° 43° 42° 41°

FIGURE 10

oped in the fertile bottomlands along the many streams draining the western slope of the Cascades, and later on the less fertile but extensive cut-over and prairie uplands.

In contrast, the inland region is characterized by greater extremes of temperature, growing seasons that range from six months to less than three, and a low annual precipitation, averaging from 8 to 15 inches in most of the cropland areas. An exception is northern Idaho, where rainfall exceeds 20 inches.

As a result, many fundamental differences are apparent in the agriculture that has developed in the two regions.

Irrigation

East of the Cascade Range, irrigation is of such vital importance that without it agriculture is largely confined to dry-land grains and native grasses. Limited exceptions are found in the higher rainfall areas, principally northern Idaho. West of the Cascades, even though a more or less acute rainfall shortage is usually experienced during the latter part of July and the early weeks of August, a diversified and frequently a highly intensified agriculture has developed without the aid of irrigation. A partial exception to this prevails in the southern Oregon subregion, where irrigation assumes a more fundamental role in crop production. These basic differences explain why irrigation is referred to as "supplemental" in the western climatic region but not in the inland area except as it pertains to further improvement of present irrigation systems.

Since the greater portion of the Northwest is characterized by a semiarid climate and the remainder suffers from precipitation shortages during the midsummer growing season, it is logical that among the several types of development the place of first importance should be held by irrigation—the chief proposal in connection with about 7,537,000 acres. In addition, irrigation for 78,000 acres has been suggested as a secondary need in areas proposed chiefly for clearing or drainage. Of the former acreage, 27 percent is in class A proposals, 43 percent in class B, 29 percent in class C, and 1 percent unclassified.

It is significant to note that about 85 percent of all prospective irrigation is located in the semiarid areas, where water is a primary controlling factor. The remaining 15 percent is located principally in the western climatic region and is distributed largely over lands that are already in fairly intensive use.

The chief justification for irrigation in the latter area is for further diversification, intensification, and stabilization of present farming. Where the resources of existing farms are inadequate to provide a satisfactory family living, irrigation is an important means of expanding the size of farm business. In the case of larger farms, the increased productivity per acre as a result of irrigation will permit subdivision and thereby provide a proportionate number of new farm settlement opportunities.

Drainage

Drainage needs fall into two principal categories—(1) those in which drainage is a fundamental need in itself as a requisite to land reclamation, and (2) those in which drainage becomes a need in connection with irrigation where both are needed to control adequately the soil-moisture content.

Drainage proposals involving needs of the first type are confined largely to scattered locations along stream bottoms and tide flats in western Oregon and Washington, and total over 200,000 acres. Bottom land areas in general, because of their fertility, accessibility, and comparative lack of timber, have been settled and developed for many years; consequently, the remaining opportunities for economical development are definitely limited. This is evident from the classification of proposals, which places only 20 percent of the above acreage in class A while 34 percent is in class B and 45 percent in class C. One percent is unclassified.

Drainage proposed as a complement to prospective irrigation is needed principally in the Willamette Valley and exceeds 500,000 acres. With more detailed information concerning irrigation needs in the semiarid areas, this figure might be greatly increased. Earlier irrigation developments did not always provide for necessary concomitant drainage facilities, but experience has revealed that the two are interdependent and has strongly emphasized the desirability of providing for adequate drainage as an integral phase of irrigation. Current investigations are following this practice.

Clearing

Land clearing consists of removing trees, stumps, and brush from prospective cropland and, obviously, is confined to timbered and cut-over areas. Of the 930,600 acres proposed primarily for clearing, over 83 percent are located west of the Cascade Range and are confined largely to upland areas adjacent to long settled bottomlands. The remaining 17 percent are situated principally in northern Idaho and northeastern Washington. On another 153,000 acres, clearing is considered a secondary need in connection with other types of land treatment. Where clearing is the chief need, 47 percent of all acres involved have received class A ratings, 38 percent are in class B, and 15 percent in class C.

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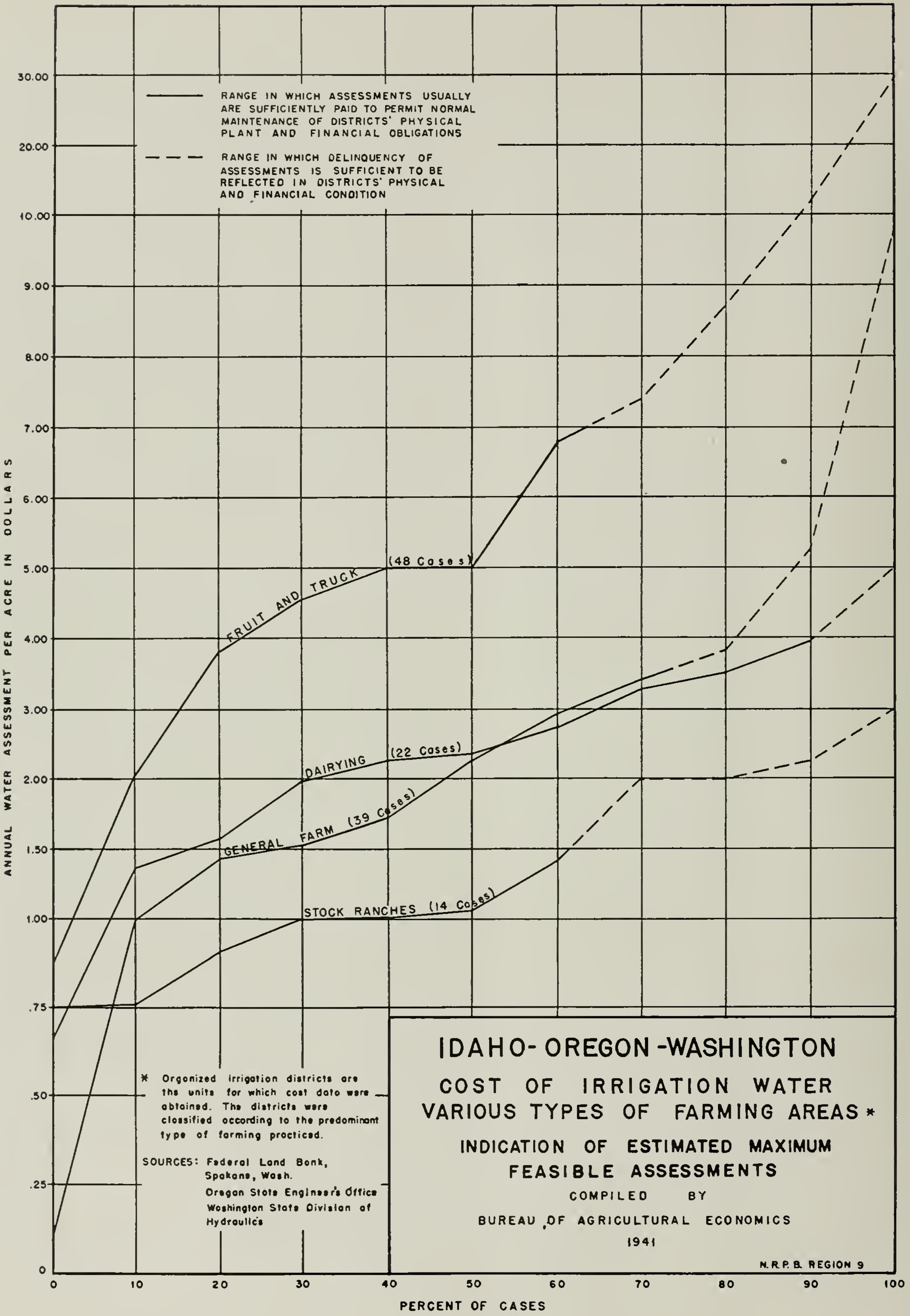

RANGE IN WHICH ASSESSMENTS USUALLY ARE SUFFICIENTLY PAID TO PERMIT NORMAL MAINTENANCE OF DISTRICTS' PHYSICAL PLANT AND FINANCIAL OBLIGATIONS
RANGE IN WHICH DELINQUENCY OF ASSESSMENTS IS SUFFICIENT TO BE REFLECTED IN DISTRICTS' PHYSICAL AND FINANCIAL CONDITION
FRUIT AND TRUCK
(48 Cases)
DAIRYING
(22 Cases)
GENERAL FARM (39 Cases)
STOCK RANCHES (14 Cases)
ANNUAL WATER ASSESSMENT PER ACRE IN DOLLARS
30.00
20.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.50
1.00
.75
.50
.25
0
0
10
20
30
40
50
60
70
80
90
100
PERCENT OF CASES
* Organized irrigation districts are the units for which cost data were obtained. The districts were classified according to the predominant type of farming practiced.
SOURCES: Federal Land Bank, Spokane, Wash.
Oregon State Engineer's Office
Washington State Division of Hydraulics
IDAHO-OREGON-WASHINGTON
COST OF IRRIGATION WATER
VARIOUS TYPES OF FARMING AREAS *
INDICATION OF ESTIMATED MAXIMUM FEASIBLE ASSESSMENTS
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS
1941
N.R.P.B. REGION 9

FIGURE 11

The difficulty and feasibility of clearing varies considerably within the two major climatic regions as well as between them. In the western area, as compared to northern Idaho and northeastern Washington, timber growth is more rapid, stumps are larger and more numerous, clearing is more difficult, and costs are proportionately higher. Within the western areas, costs will vary from $30 per acre, where clearing is comparatively easy, to over $200 per acre along the coastal valleys of the Olympic Peninsula, where timber growth is most rapid and stumps larger. Needless to say, these latter costs are considered exorbitant under prevailing conditions, and therefore the development potentialities must be considered remote. In northern Idaho, the average costs of clearing are much lower, and the range much narrower—$7 to $24 per acre.

Recent improvements in land clearing methods should contribute greatly to an accelerated clearing program in the near future. Modern methods are centered around the use of a bulldozer equipped with a specially designed toothed blade operated by a hydraulic lift. The main obstacle to a rapidly expanding program of clearing is the current nonavailability of adequate long-term credit for this type of land treatment.

Factors Influencing Feasibility

The numerous factors that operate to influence feasibility of land developments may be sorted into two groups—physical and economic. As a rule, the physical factors are more fundamental, since they include the basic resources of soils, topography, and climate. Economic variables, however, are frequently more complex and assume an important role in influencing feasibility.

Perhaps the most important economic variable revolves around cost of development. A project that is not feasible today because of excessive cost may become feasible tomorrow by virtue of new or improved methods of development. Likewise, cost as a limiting factor may be discounted, especially in the case of dual purpose projects, by a determination that a greater share of the costs should be borne by flood control or some other such benefit. Moreover, it is conceivable that future public policy may even charge a share of development costs to the benefits to society.

Methods and terms of financing development costs are likely to be vital factors affecting the feasibility of projects. Currently, in the case of land clearing, there is no adequate provision for much-needed long-time credit, although the Farm Security Administration is making considerable effort and progress in this direction. Concerning land reclamation by irrigation, current policies of the Bureau of Reclamation often stipulate 40 years without interest for repayment of construction costs. Computations of the Corps of Engineers as included in their Willamette River flood-control and irrigation study assume a 40-year repayment period at 5 percent interest. The net difference in these two policies is that in the latter the farmer would pay twice as much for benefits received. Private financing is usually based on shorter repayment periods and higher interest rates.

Virtually all eligible irrigation and drainage districts in the Pacific Northwest have taken advantage of the opportunity afforded them by the Federal Reconstruction Finance Corporation and by State agencies to refinance their debts and thereby extend their loans and reduce interest rates.

Land values have their influence on feasibility. In many areas of high quality land agriculture has failed or become seriously burdened by overspeculation and overevaluation of land. Neither one is conducive to proper land use, inasmuch as each tends to force an overintensive use in an attempt to carry excessive land costs.

Of somewhat different character, but still vitally important, is the location of development areas with respect to roads and schools. Often a small area is well suited to development except that it would create or greatly intensify road and school fiscal problems. This factor becomes of lesser importance as the areas concerned become large enough economically to support their share of the public facility burden.

Finally, the types of farming for which an area is adapted and the sizes of farms existing or contemplated are obviously basic in any calculation of feasibility.

Classification of Proposals

Experience has revealed quite conclusively that the economic feasibility of land development and reclamation cannot be accurately estimated except after thorough and detailed investigation. In view of this experience, it would be fruitless to attempt to rate the feasibility of development proposals listed herein, inasmuch as a vast majority have never been investigated beyond a reconnaissance survey. Insofar, however, as developments of the future will be drawn from proposals of today, it does not seem futile to evaluate available information in an effort to judge the relative merit of proposals for further investigation.

Consequently a classification has been devised that is based on the results and degree of past investigations and indicates the relative desirability of proposals for further or more detailed investigation. For the few proposals that already have been examined in considerable detail, the classification is intended to reflect their feasibility or the extent to which it is limited under present conditions.

Three main classifications have been used—primary, secondary, and deferred. Under each, several categories have been delineated to permit segregation of proposals with inherent differences or with variations in extent of investigation. Inherent differences apply particularly to fundamental dissimilarities in the nature of the development, such as between land clearing on the one hand and irrigation and drainage on the other. Irrigation and drainage, because they nearly always involve group action and require outside financing, usually have had greater technical investigation than has land clearing, which is more commonly carried out on an individual farm basis. To recognize this difference it was found necessary to set up in the classification a separate category in each class solely for land clearing.

Symbols and definitions of the various classes of proposals and categories within each follow.

PRIMARY

(Those proposals with no apparent disqualifying limitations to feasibility.)

A. *Clearing.*—Those areas which have had enough investigation to indicate they are worthy, under prevailing conditions, of detailed investigation of individual tracts to determine the feasibility of clearing.

A1. *Irrigation or drainage.*—Those proposals which are now under development or those which have recently been completed and offer opportunities for further settlement.

A2. *Irrigation or drainage.*—Those proposals sufficiently investigated to show evidence of feasibility under present conditions.

SECONDARY

(Those proposals for which there are apparent minor limitations to feasibility or for which the limited information available does not give convincing evidence of feasibility or lack of it.)

B. *Clearing.*—Those areas for which available information indicates a need for adjustment of such "short-term" factors as cost of clearing and policies of financing costs but which otherwise appear worthy of more detailed investigation.

B1. *Irrigation or drainage.*—Those proposals which have had sufficient investigation to show that feasibility is conditional upon "short-term" factors such as power rates, transfer of water rights, allocation of proposed water storage, repayment policies, legal involvements, partial subsidization, or in some cases proposals now under investigation.

B2. *Irrigation or drainage.*—Those for which little investigation has been made but which appear worthy of further investigation under present conditions.

DEFERRED

(Those proposals for which there are apparent major limitations to feasibility; or those which have been superseded by other projects or proposals, or abandoned.)

C. *Clearing.*—Those areas for which available information indicates a prevalence of such "long-term" limiting factors as soils and location with respect to roads and schools, and which do not appear worthy of further investigation under present conditions.

C1. *Irrigation or drainage.*—Those suggested proposals for which considerable investigation indicates a lack of feasibility because of "long-term" factors such as soils, lack of storage space, excessive pumping lifts, nonavailability of water, or disqualifying land uses and values.

C2. *Irrigation or drainage.*—Those for which some study has been made but which have not been adequately investigated and which appear unworthy of further investigation under present conditions.

C3. *All types.*—Those which have been abandoned or superseded by other developments or proposals.

UNCLASSIFIED

(A number of proposals have not been given a rating either because they were in the process of investigation and findings to date could not be ascertained or because no suitable information was available on which to base a classification.)

"Short term" and "long term" limiting factors as used in the definitions warrant further discussion. Limitations, in general, include those physical and economic factors that operate in regard to a given proposal to make it less feasible than it would be were the factors not present.

Where limiting factors are such that they might be removed by such developments as technological improvements, a reallocation of costs, a revised method of financing, or a legislative act, they have been considered to be of a "short term" character.

On the other hand, where the limiting factors are rooted in shortcomings of the basic physical resources, or are of such an economic character that man could not change them except over a long period of time, they have been considered "long term" factors.

It is conceivable, of course, that factors normally of a "short term" character could become so disqualifying as to render a project infeasible and, therefore, place it in a deferred category. Conversely, "long term" factors occasionally might operate to such a limited extent that they could not be considered as fundamental disqualifications.

Purpose of Development

The two purposes of land development as considered herein are (1) to benefit farms already established and (2) to provide for new farms. Total acres contribut-

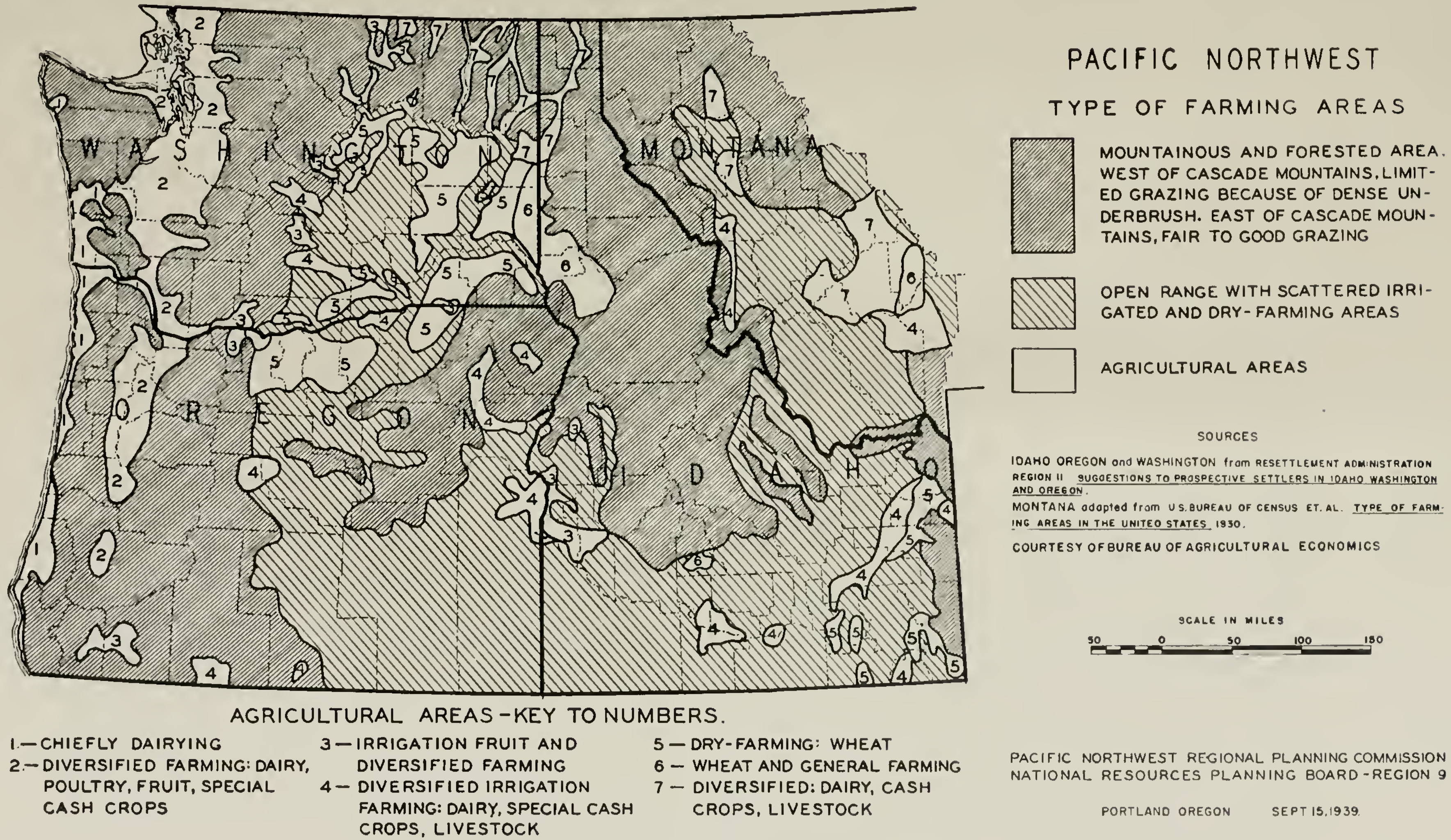

PACIFIC NORTHWEST
TYPE OF FARMING AREAS
MOUNTAINOUS AND FORESTED AREA. WEST OF CASCADE MOUNTAINS, LIMITED GRAZING BECAUSE OF DENSE UNDERBRUSH. EAST OF CASCADE MOUNTAINS, FAIR TO GOOD GRAZING
OPEN RANGE WITH SCATTERED IRRIGATED AND DRY-FARMING AREAS
AGRICULTURAL AREAS
SOURCES
IDAHO OREGON and WASHINGTON from RESETTLEMENT ADMINISTRATION REGION II SUGGESTIONS TO PROSPECTIVE SETTLERS IN IDAHO WASHINGTON AND OREGON.
MONTANA adapted from U.S. BUREAU OF CENSUS ET. AL. TYPE OF FARMING AREAS IN THE UNITED STATES 1930.
COURTESY OF BUREAU OF AGRICULTURAL ECONOMICS
SCALE IN MILES
50
0
50
100
150
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD - REGION 9
PORTLAND OREGON SEPT 15, 1939.
WASHINGTON
OREGON
IDAHO
MONTANA
AGRICULTURAL AREAS - KEY TO NUMBERS.
1.— CHIEFLY DAIRYING
2.— DIVERSIFIED FARMING: DAIRY, POULTRY, FRUIT, SPECIAL CASH CROPS
3 — IRRIGATION FRUIT AND DIVERSIFIED FARMING
4 — DIVERSIFIED IRRIGATION FARMING: DAIRY, SPECIAL CASH CROPS, LIVESTOCK
5 — DRY-FARMING: WHEAT
6 — WHEAT AND GENERAL FARMING
7 — DIVERSIFIED: DAIRY, CASH CROPS, LIVESTOCK

FIGURE 12

ing to the former purpose number a little over 4,235,000 and to the latter, about 4,440,000. Factors governing the prevalence of these purposes in the several subregions can be traced to the previously outlined climatic differences.

West of the Cascade Range, where a comparatively high proportion of arable lands are already in agricultural use, the strongly predominant purpose is to benefit existing farms. Furthermore, this proportion is greater for the class A proposals than for those in class B or class C. This is clearly evident from the subregional figures, and is significant in that it not only reflects a need for improving present farms (either by clearing to expand crop acreages or by irrigation and drainage to increase production per acre) but also indicates an opportunity for ameliorating the present small-farm problem. The regional summary tends to obscure these subregional distinctions, but does not entirely obliterate them. In the case of clearing, which is needed predominantly in the western area, nearly 553,000 acres are to benefit present farms, while less than 378,000 are to provide for new farms.

In the inland region, where large scale reclamation projects are designed to bring vast areas formerly devoted to sagebrush, native grasses, or dry-land wheat into a comparatively intensive use, it is evident that the purpose must be primarily to provide for new farms. Any existing dry land farms or ranches in reclamation areas stand to benefit from the prospective land improvement, but their number, as a rule, is relatively small as compared with the number that can be supported under the more intensive use contemplated. This condition is strongly revealed by the subregional figures and is in evidence in the regional totals, which show for irrigation, nearly 3,600,000 acres to benefit present farms and nearly 4,000,000 to provide new farms.

Frequently it has been found desirable to propose development further to improve areas already irrigated. In such cases the purpose is primarily to benefit existing farms, even though a few new farms might well result.

Drainage proposals as summarized for the Pacific Northwest include nearly 85,000 acres to benefit present farms and over 116,000 acres for new farms. Drainage as a need in itself is similar to irrigation in that it often allows for a much more intensive land use and, therefore, can result in subdivision and more farms. Drainage when of secondary importance to other types of treatment, however, is predominantly for the purpose of benefiting existing farms—as shown by an almost 9-to-1 ratio between acres to benefit present farms and acres for new farms. This can be attributed largely to the need for drainage as a complement to irrigation in the Willamette Valley, where irrigation is almost entirely an improvement for existing farms. If the needs for drainage in conjunction with potential irrigation in the semiarid areas were equally well known and could be segregated, quite likely the ratio would approach a balance.

Probable Types of Farming and Sizes of Farms

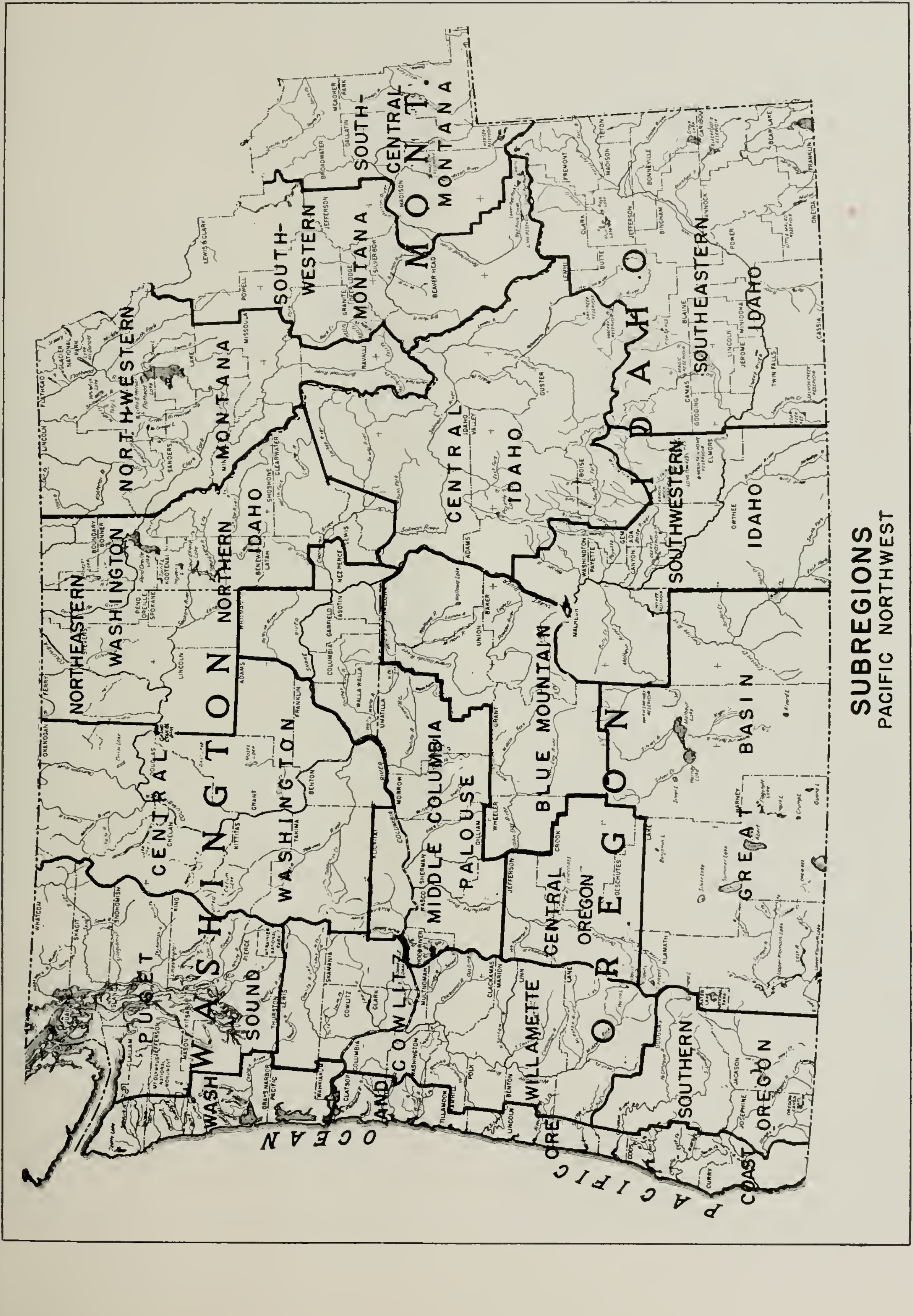
Prevailing and recommended types of farming result from man's efforts to follow farming practices that, within the limitations of physical and economical resources, will yield the greatest monetary return. Of these limitations, the physical are usually the most fundamental; but the economic, because of their variability, become the most intricate.

To determine proper sizes and types of farms for any given area requires a weighted consideration of many interwoven factors which usually can be unraveled only by means of a technical survey. Inasmuch as such surveys are not available except for a very limited number of proposals, it has been necessary to use other methods of deriving recommendations for farm sizes and types. For this reason the basis of estimation deserves explanation.

Except for projects where investigational reports are available, the chief factors influencing recommendations for types and sizes of farms have been the apparent success or lack of success of existing farms in the same areas or in similar, comparable areas. Specific estimates and recommendations were derived from consultation with qualified individuals, including farmers, county agents, county Farm Security Administration supervisors, irrigation and drainage district officers, Federal Land Bank representatives, and agricultural college staff members. Farm management studies, where available, contributed a great deal. It should be understood that all recommendations represent an average of quite a wide range of conditions and therefore will not necessarily apply to any particular farm.

Natural differences affecting types of farming exist within as well as between the broad climatic regions; it can be said, however, that perhaps the most prominent single farm enterprise in the entire Pacific Northwest is dairying.

West of the Cascade Range, where it enjoys the distinct benefits of a mild and equable climate, dairying prevails as the principal enterprise in nearly all farming areas. Fruit, truck, and poultry are highly important secondary enterprises and in localized areas become primary. In the semiarid areas east of the Cascades, dairying usually retains an important place but gives way considerably to general and specialty crops and to range and feeder livestock. Broadly speaking, diversified general farming describes the predominant type of farming in irrigated, semiarid areas. Without irriga-



SUBREGIONS
PACIFIC NORTHWEST

FIGURE 13

tion, farming necessarily centers around wheat and range livestock.

Fruit is highly specialized in many areas. The Puget Sound country is noted especially for its berry production, the Williamette and Rouge River Valleys for nuts and a variety of fruits, the Wenatchee Valley for apples, and Hood River county for a variety of tree fruits. To a lesser degree, fruits are produced in many other areas.

Truck crops represent an intensive land use and are grown principally on the higher producing soils in the vicinity of dense population centers. Some exception to this is made possible by the canning and freezing industries, which are becoming more prevalent in the Northwest.

Recommended sizes of farms usually bear a close and inverse relation to soil productivity and intensity of land use.

In the humid areas farms naturally can be smaller than under semiarid conditions, unless irrigation is provided. Under average conditions, the sizes of family-sized dairy farms, for example, will vary from about 40 acres on the bottomlands of the Puget Sound and the Oregon-Washington Coast to 60 or 80 acres on the class 1 and 2 soils of the Willamette Valley,[3] and to 80 or 100 acres in the irrigated areas east of the Cascades. For greater detail concerning types and sizes of farms, reference should be made to the subregional discussions that follow.

No discussion of the farm economy of the Pacific Northwest would be complete without consideration of farm woodlands. In area farm woodlands of the Northwest comprise over 15 percent of all land in farms.[4] In western Oregon and western Washington, where the total population is greater than in all the remainder of the Northwest, the proportion of woodlands to all land in farms increases to over 43 percent. This percentage holds approximately for the other important forest areas of northeastern Washington, northern Idaho, and northwestern Montana. In value, according to the 1930 census, farm timber products in Oregon and Washington alone amounted to $5.5 million—about as much as the value of the berry crop of the same year.[5]

Significant as these figures are, there is still considerable room for expansion and improvement of this aspect of farm management. It is estimated that by such measures as enlargement of woodland acreages, ground preparation, better management, and improved marketing, the volume of wood production from farm woodlands could be increased one-third to one-half, and the value might be increased even more. Farm woodlands generally constitute the most accessible part of the whole forest area and usually occupy the better sites for timber growth.

Farm woodlands perform another important function. It is that of permitting full-time farms to be created and to exist in forest districts when arable acreage is not sufficient for self-sustaining farms. It can be seen that in such areas, less arable land will be needed per farm, when a reasonably constant flow of income is derived from farm woodlands, than would be needed were income derived from arable lands alone. It is one way of increasing farm opportunities and at the same time relieving pressure for arable lands.

Of a somewhat less tangible nature but definitely of both economic and social advantage are the game, fish, recreation, protective, and aesthetic values of farm woodlands.

New Farm Possibilities

Estimates of new farming opportunities that might result directly from the proposed land development could vary considerably, depending on the basis of estimation and the judgment of the estimator.

A theoretical adjustment of farm sizes in which all farms now considered too small were increased to an economic size would result in a comparatively low estimate for the possible number of new farms. A larger estimate would result if the theoretical adjustment were extended to include the scaling down of all large farms to a family size. From a practical point of view, however, neither of these adjustments can be wholly accomplished since there is no interest in expanding many small farms which are of a part-time character and for obvious reasons, no interest in subdividing many large farms.

Furthermore the estimated number of new farming possibilities could vary greatly depending on whether the estimates are based on prevailing economic conditions and population pressures or on possible, ultimate, future pressures and conditions.

The estimate of the number of new farming opportunities as arrived at in this study is tempered to a limited extent by theoretical possibilities, but is based primarily on current needs, practicalities, and limitations.

It is expected, on this basis, that about 49,500 new farms would be provided as a result of all development proposals. In addition, it is estimated conservatively that 150,000 existing farms would be benefited.

Of the new farming opportunities, 21,139, or nearly

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[3] As defined by Selby and Fryer, Oregon Experiment Station Circular No. 120, class 1 soils include the fertile recent alluviums and class 2 soils include the more fertile old valley floor soils. See table 1, page 92.

[4] Percentage derived from 1930 census figures as compiled by U. S. Forest Service, Portland, Missoula, and Ogden offices. Area considered includes Oregon, Washington, Idaho, and the 10 northwestern counties of Montana.

[5] Quoted from compilations of the U. S. Forest Service, Division of Research, Portland, Oreg.

43 percent, are in class A categories, 12,945 are in class B, 14,548 in class C, and 820 are unclassified.

Of the class A group, nearly 18,500 are connected with irrigation projects, which for the most part are now under construction. Less than 500 depend on drainage, and just over 2,000 on land clearing.

In class B, irrigation will again provide the greatest number of new farms, accounting for over 10,000. About 750 will depend on drainage and over 1,800 on land clearing.

Class C claims about 13,400, or nearly 30 percent, of all new farms dependent on irrigation. About 180 farms contingent on drainage are in the class C groups, as are nearly 950 farms contingent upon clearing.

PUGET SOUND SUBREGION

Acreage in Development Proposals

Proposals for agricultural land development by means of irrigation, drainage, and clearing in the Puget Sound subregion[6] comprise 503,800 acres. About two-thirds of this amount represents new land to be brought into crop production, but less than a quarter is proposed primarily to provide additional farms. A major objective of many proposals is to relieve an existing, acute small-farm problem either by expanding cultivated acres per farm through land clearing, or by increasing the productive capacity of present crop land through irrigation and drainage.

Land-clearing proposals total 341,500 acres and are concerned predominantly with cut-over, upland areas. This figure represents essentially the extent of new lands that, on the basis of present knowledge of their physical and economic aspects, are considered as having favorable possibilities for cultivation.

Irrigation proposals contemplate the application of water to 157,900 acres, virtually all of which are within long-settled bottom or valley land areas. With the exception of 21,300 acres on the Olympic Peninsula and 2,300 acres in Thurston County, all proposals have in view an emphasis on sprinkler irrigation, often by means of pumping from moderately shallow individual farm wells, but wherever feasible by diversion from the many streams feeding into Puget Sound. Some of the irrigable areas seem to offer considerable opportunity for flood irrigation. This calls for group organization such as is provided for by the incorporated irrigation district. Enthusiastic interest in this type of organization is lacking, however, probably because of the supplementary nature of the need for irrigation.

Nearly all lands proposed for sprinkler irrigation are now in crop production and, in the main, represent the best agricultural lands not only in the subregion but in the entire Pacific Northwest. Of the 21,300 acres on the Olympic peninsula proposed for irrigation (largely by flooding), 12,000 are in an old project that has been dormant for a number of years. Much of the acreage, however, is in agricultural use at present. Because of a limited water supply, all new land to come into crop production as a result of irrigation development probably would not exceed 7,000 acres for the entire subregion.

Drainage development proposals, with only a few exceptions, are limited to bottom-land areas where drainage is a primary need. The total area involved in all such proposals is only 4,400 acres. In addition, however, a considerable amount of the land proposed for clearing and some proposed for irrigation will require drainage as well. Lack of detailed information on these areas has prevented showing the overlap more completely. New lands to be brought into agriculture through drainage development under the present proposals are quite limited. This results from the fact

TABLE 6.—*Puget Sound subregion—Summary of Proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals[3]	503, 800	394, 720	109, 080	1, 628
Class A	164, 720	114, 600	50, 120	652
Class B	204, 480	172, 520	31, 960	484
Class C	134, 600	107, 600	27, 000	492
CLEARING				
Total clearing	341, 500	233, 820	107, 680	1, 562
Class A	164, 720	114, 600	50, 120	652
Class B	87, 380	56, 220	31, 160	468
Class C	89, 400	63, 000	26, 400	442
IRRIGATION				
Total irrigation	157, 900	157, 900		
Class A2	[4] (1, 200)	(1, 200)		
Class B2	113, 300	113, 300		
	(5, 500)	(5, 500)		
Class C2	32, 600	32, 600		
Class C3	12, 000	12, 000		
DRAINAGE				
Total drainage	4, 400	3, 000	1, 400	66
Class A2	(5, 120)	(4, 800)	(320)	
Class B2	3, 800	3, 000	800	16
Class C2	600		600	50

[1] For detailed tabulation of projects see appendix table 1.

[2] For definition of various classes see p. 38.

[3] These exclude overlap as described in footnote 4 below.

[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

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[6] Puget Sound subregion includes all of Whatcom, Skagit, Snohomish, King, Pierce, Thurston, Mason, Kitsap, San Juan, and Island Counties, and approximately the eastern three-fourths of Jefferson and Clallam Counties, all in the State of Washington.

that much of the oldest agriculture in the Pacific Northwest is on the bottom-land soils; and therefore the more economical diking and drainage developments were carried out years ago. Some areas still remain, however, that would benefit by new or improved diking and drainage; the limiting conditions are either that the development costs would greatly exceed the expected benefits or that land values are too high to justify an agricultural use.

Of the half million acres involved in proposals of all types, the development of 394,720 would be primarily for the improvement and stabilization of present farms, while only 109,080 would be to provide new farms. However, even in areas where development is largely to benefit present farms, it is inevitable that some subdivision will take place, and, therefore, some new farming opportunities accrue.

Behind this emphasis for development to benefit present farms lies the prevailing small-farm problem which has evolved from a chain of events closely associated with the rise and decline of logging operations in numerous localities. During the period of expansion of the lumber industry in the Puget Sound area, as well as in almost all other timber areas of the Northwest, numerous communities of part-time farms came into being, the lumber industry providing the necessary off-the-farm income as well as a local market for part of the produce. Depletion of the timber resources and the attendant recession and removal of the lumber industry from many communities have taken away this source of supplementary income from thousands of part-time farmers. A heavy rural relief load has resulted.

Both the small-farm problem and the relief load have been intensified by abnormally heavy migration during the past decade of drought-stricken farmers from the Great Plains.

New Farm Possibilities

Proposals, if developed under prevailing conditions, would provide for about 1,628 new farms, very largely on the cut-over uplands. Of these, about 650 are included in proposals that are rated in class A. The remaining thousand are about evenly divided between class B and class C. The proposed land improvements would benefit about 12,000[7] existing farms through expansion or improvement of their present cropland. Because of the small-farm problem, it is not recommended that new farms be created by subdivision of present units. It follows, therefore, that the new farms contemplated in the proposals would be established on lands not now farmed.

Probable Types of Farming and Sizes of Farms

Dairying is definitely the predominant type of farming recommended for the proposed development areas. Other important recommendations include poultry, small fruit production, and truck gardening.

The importance of dairying to the Puget Sound area is illustrated by the fact that this enterprise outvalues all other specialized branches of agriculture in the State of Washington, and that the Puget Sound area is the leading dairy section of the State, accounting for over half of the total production.[8]

Small fruit production is highly specialized in certain counties and, from the physical standpoint, offers opportunity for considerable expansion. The wide variety of small fruits grown include: raspberries, blackberries, cherries, strawberries, loganberries, gooseberries, and currants.

Truck farming is physically adaptable to most of the rich bottom-land area of the Puget Sound, although for economic reasons it has not become as important an agricultural enterprise as dairying, fruit, or poultry. With the recent rapid development of the frozen-food industry in the Northwest, the market for both fruits and vegetables has been greatly expanded; and, concurrently, the acreages devoted to these crops have increased. The prospect for further development in this direction is very favorable.

Although poultry is not always a true agricultural enterprise, its importance as a source of income in farming areas should not be overlooked. In this subregion, poultry is commonly recommended as a secondary enterprise to all farming located wholly or partially on the upland cut-over areas.

Farm woodlands are of especial importance in this area and provide a desirable source of farm income. Rapid timber growth, mobile logging equipment, relatively widespread transportation facilities, and a diversity of markets for forest products all combine to make farm woodlands a distinct economic asset.

Climate must be recognized as an exceedingly important advantage to prevailing types of farming, especially dairying and poultry. The average daily temperatures range from about 38° during the winter months to 62° during the midsummer. The daily range of temperature is low, occasionally being less than 5° in winter and seldom being over 27° in summer. Annual precipitation averages about 27 to 40 inches in the farming areas, with the height of the dry season occurring usually between the latter part of July and the middle of August.

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[7] This admittedly is a rough estimate derived from local people and records of the census.

[8] Belle Reeves, Secretary of State, *Washington, Its People, Products, and Resources*, 1940 Edition, page 81.

Successful sizes of farms are so closely related to soils that any discussion of farm sizes must recognize soil differences, and present recommendations are made accordingly. In a broad classification of the Puget Sound basin, all farm lands, present and potential, may be grouped into two general physiographic classes: (a) areas of recent alluvial deposit commonly referred to as stream bottoms, deltas, and tide flats; and (b) rolling glaciated upland areas.

Soils of the bottom lands are often highly productive and have a wide range of crop adaptability.

It is usually recommended that dairy farms on these soils, if favorably located with respect to markets and transportation facilities, should include about 40 acres—all of which should be improved cropland. Although few recommendations would permit a dairy farm of less than 40 acres, several suggest that even in the better areas a dairy unit should include at least 60 acres, of which at least 40 should be in crop production.

Fruit or berry farming on the bottom lands can be practiced on much smaller tracts. For example, in Pierce County on the Puyallup River bottoms, 10 acres are considered ample for a full-time, family-sized berry farm.

Truck farming of an intensive type likewise requires only 10 to 15 acres of the bottom-land soils for a full-time farm. Poultry is commonly a supplementary or complementary enterprise on these smaller farms, especially where part of the farm is on less valuable soil.

Soils of the uplands vary widely in quality and productivity and definitely have lower agricultural value than the valley soils. Obviously, farms in upland areas should be considerably larger than those on the valley floors. The principal limitations to use are steeply sloping topography and stony, gravelly, or sandy surface and subsoils.

Unless irrigated, dairy farms on the upland soils should contain at least 80 acres, 40 of which should be in crop cultivation; they often should include 100 acres with 60 to 80 acres in crops; and occasionally they should be as large as 120 to 160 acres, with from 50 to 160 acres in crops.

In terms of minimum size, it has been suggested that a full-time, family-sized dairy farm on cut-over lands probably should contain 60 acres, of which 30 should be cleared for hay and grain production and 30 used for seeded stump pasture.[9] This statement assumes that such farms would support 12 milking cows.

Fruit and poultry farms in upland areas can be considerably smaller than dairy farms, but should be larger than comparable types of farms in the bottomland areas. Again, it is recognized that the size of poultry farms is governed more by the method of operation than by the soil productivity, since quite often much or all of the feed is purchased rather than raised on the farm.

Where irrigation is proposed to increase and stabilize production, the recommended size of farm is usually reduced, except where the original recommendation was considered the smallest desirable size for a given type of farming regardless of the productivity. For example, it is felt that 40 acres is the minimum desirable size for dairy farms, even with irrigation. Irrigation of these units is proposed primarily further to improve and stabilize production and income rather than to permit any subdivision.

This is not true, however, in the case of larger farms. For example, an upland dairy farm without irrigation and comprising 80 acres with 40 in crop cultivation might be reduced under irrigation to 40 acres, all cropped, and produce a comparable or even an increased annual net income.

In marked contrast to the recommended sizes of farms, especially in the cut-over areas, stands the average sizes of present farms. Several surveys in recent years have revealed not only that the average total size of farms is small but also that the proportion of cleared and cropped acres per farm is extremely small.

On the upland cut-over areas of western Washington in 1939, about one-third of all occupied farms were less than 20 acres in total area, and an additional 43 percent were only 20 to 45 acres in total size. More significant, the cleared area per farm was less than 10 acres for about 75 percent of all farms and less than 2 acres for nearly one-third of all farms.[10]

In Pierce County, in 1933, a survey was made of 1,241 farms growing raspberries. Of these, it was found, less than 15 had over 10 acres of land, while 1,000 had less than 3 acres each.[11]

A study of farm sizes in Snohomish County revealed that the 2,077 farms participating in the AAA program contained an average of about 61 acres, of which 27 were in cultivation; but that the 3,934 farms not in the AAA program averaged only 2.7 acres of cropland per farm.[12] Probably many of the noncooperating farms were of a part-time nature.

The rather wide difference between the total acres in farms and the cropped acres is significant in that it indicates an opportunity, in many cases, to expand the crop acres per farm wihout combining farms or displacing farmers.

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[9] Heisig, Carl P., Migration and Settlement Report No. 6: *Cutover Lands of Western Washington*, Bureau of Agricultural Economics, Berkeley, Calif., August 1941, p. 5.

[10] *Ibid.*, p. 2.

[11] Reported by Richardson, A. M., county agent, Pierce County, Wash.

[12] Reported by Smith, Arnold, county agent, Snohomish County, Wash.

Classification of Proposals

Of the acreage proposed for clearing, a large majority is not to provide new farms but rather to benefit existing farms. Furthermore, proportionately fewer new farms are contemplated by the class A proposals than by those classed as B and C. These facts reflect a need for expanding and improving present farms and show that many of the best development opportunities relate to this purpose.

Within class B clearing proposals, there are probably many class A tracts; in fact it may be discovered with further investigation that whole areas now classed as B should be raised to the A group.

Class C clearing proposals represent nearly one-fourth of the total clearing potentialities and over one-fourth of the new farm potentialities. As covered by the definition, proposals in this category have important limiting factors and cannot be considered for economical development except as fundamental changes may occur in the rather distant future. It is recognized, of course, that in a C area, tracts worthy of a B or even an A classification may exist.

Clearing proposals, especially where clearing is the sole or the primary development involved, are located almost entirely on the upland soils which are definitely less productive than the bottom lands. This accounts to some extent for the high percentage of such proposals carrying B and C classifications.

Probably the two most important factors hindering an accelerated clearing program are excessive cost for clearing and lack of adequate long-term credit. Some timber companies are promoting settlement of uncleared, cut-over lands but often without regard to the soil characteristics or to sound economics.

Clearing costs will vary considerably over the subregion, depending on the size and age of stumps, number of stumps per acre, density of brush and second growth, soil, and topography. A study of clearing costs under the bulldozer method reveals that costs have been ranging from $18 per acre, in areas where clearing has been very easy, to $80 per acre where clearing has been difficult.[13] Within this range, two-thirds of all jobs studied averaged from $39 to $57 per acre. These estimates include the costs for explosives, blasting labor, bulldozer work, and hired labor for picking up small pieces while the bulldozer is in operation; but they do not include labor or other costs for burning or otherwise disposing of the debris after the bulldozer work is completed. The costs to prepare a field for its first seeding after the bulldozer work is done often exceed the initial clearing cost by 50 percent.[14] However, much of this latter cost is for labor, which may be done largely by the farmer.

Potential irrigation is all of a supplementary nature intended to benefit present farms. It will be noted that nearly 72 percent of these potentialities fall in class B; none in class A, except for a small number that are secondary to land clearing; and the remainder in class C.

The preponderance of class B irrigation proposals and the few class A proposals are largely accounted for by a past lack of interest and a consequent lack of technical investigation both as to the extent of ground water availability and the value of supplemental water to agriculture. Lack of interest can be attributed largely to the mild and humid climate. Because of this, irrigation has been considered an improvement of secondary importance, and often its desirability and feasibility have been questioned. A closer analysis of the climatic and agronomic conditions reveals however, that the rainfall drops off decidedly during the growing season [15] and that crop growth is greatly retarded during midsummer drought periods.

The value and principal justification of irrigation under these conditions will be to provide supplementary moisture to present farms during the midsummer growing season, thereby increasing yields, stabilizing production, and, if development is economical, increasing and stabilizing farm income. It is felt that benefits to accrue will be almost wholly reflected in increased size of farm business and will not operate to provide very many additional farms.

Regarding costs, it is often stated that installation of sprinkler irrigation equipment on farms in western Washington and Oregon will average from $35 to $50 per acre. A recent study of the BAE and the Washington State Extension Service found that the average investment cost of sprinkler systems on 32 western Washington farms was $36.50 [16] per acre.

A good many installations of higher and lower costs have been in operation for several years with apparent success and profit.[17] In general, however, it has been found desirable to keep costs per acre under $30.[18]

Lands of the type susceptible to and primarily in need of drainage are usually the most fertile lands of the

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[13] Willard W. Troxell and Harry J. Voth, *Land Clearing in the Pacific Northwest*, Bureau of Agricultural Economics, Berkeley, Calif., 1940.

[14] *Ibid.*

[15] Average precipitation in cropland areas of western Washington is less than 3 inches during June, July, and August, the principal growing months.

[16] Cagle, Arthur J., and Stonecipher, Harvey, *An Economic Study of Form Irrigation in Western Washington*, Agricultural Extension Service and Bureau of Agricultural Economics, Pullman, Wash., June 1940, p. 1.

[17] *Ibid.*, p. 9.

[18] *Ibid.*, p. 1.

APPROXIMATE PRESENT DRAINED AREAS

▨ DRAINED AREA

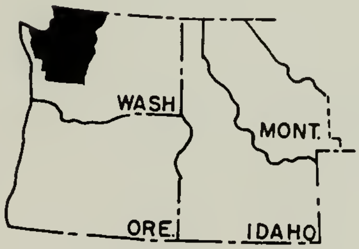
SUGGESTED POTENTIAL DRAINAGE *

■ NEW DEVELOPMENT

▩ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

(3/2B) — Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.



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WASHINGTON STATE DEPT. OF
CONSERVATION AND DEVELOPMENT

PUGET SOUND SUBREGION

DRAINAGE

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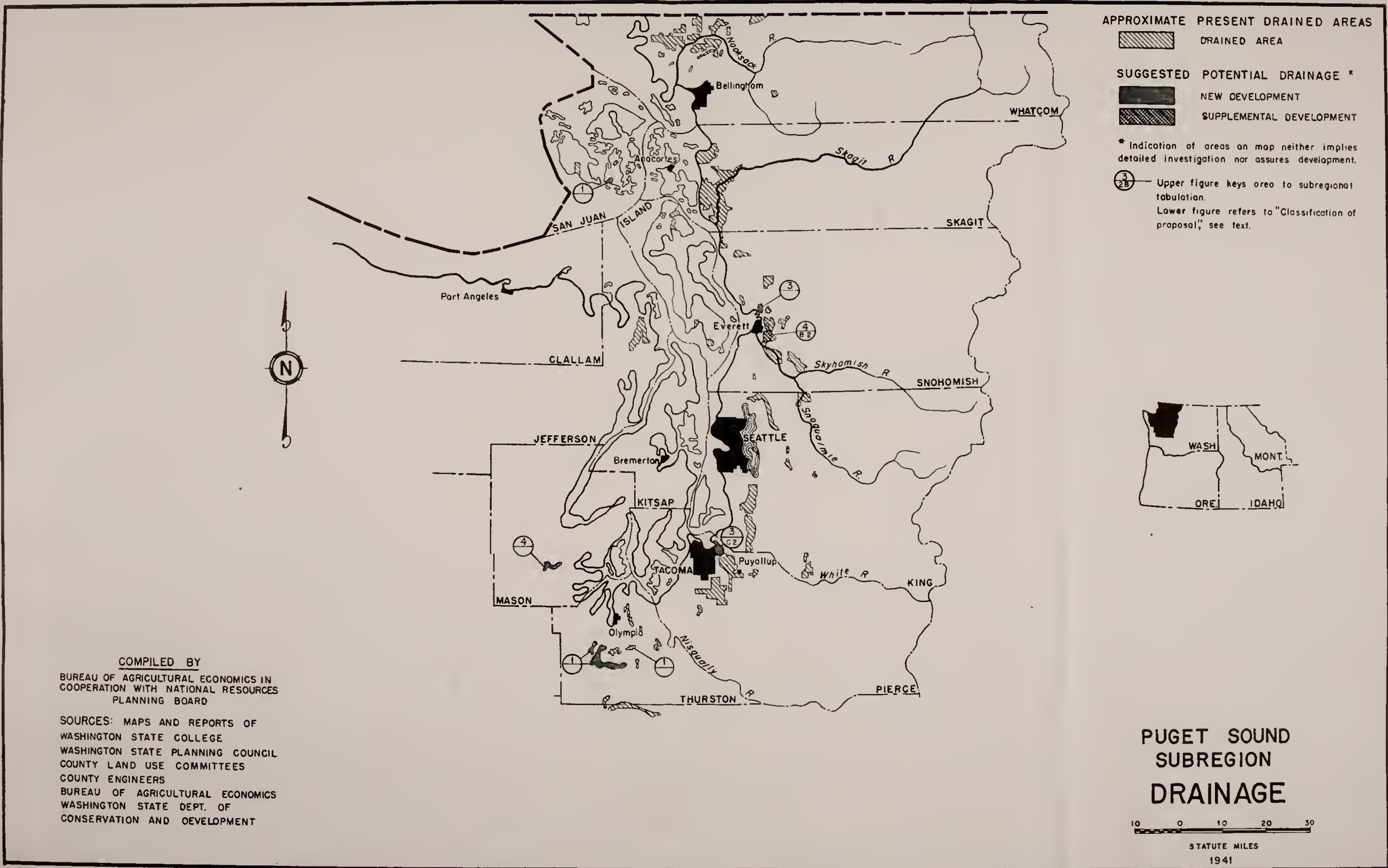

PUGET SOUND SUBREGION
DRAINAGE

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FIGURE 14

444553—42 (Face p. 46) No. 1

APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

o ° o ° SCATTERED IRRIGATION ,

SUGGESTED POTENTIAL IRRIGATION *

▤ NEW DEVELOPMENT AREAS

▨ SUPPLEMENTAL DEVELOPMENT 1/

SUGGESTED POTENTIAL CLEARING *

▒ RELATIVELY COMPACT AREAS

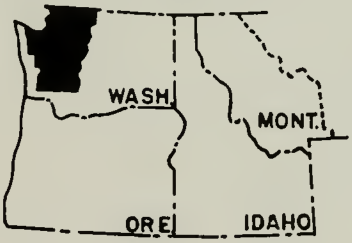
░ SCATTERED AREAS

* Indication of areas on map neither implies detailed investigation nor assures development.

3/B1 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.

1/ All potential irrigation in this subregion considered supplemental since areas involved are already well developed, settled, and farmed.

NOTE: Where proposed irrigation and clearing development overlap the area is mapped according to the primary type.



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WASHINGTON STATE PLANNING COUNCIL
COUNTY ENGINEERS
U. S. GEOLOGICAL SURVEY
WASHINGTON STATE COLLEGE
U. S. ARMY, CORP OF ENGINEERS
WASHINGTON STATE DEPT. OF
CONSERVATION AND DEVELOPMENT
IRRIGATION DISTRICTS
COUNTY LAND USE COMMITTEES

PUGET SOUND SUBREGION

RRIGATION & CLEARING

10 0 10 20 30

STATUTE MILES

1941

APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

○ ○ ○ ○ SCATTERED IRRIGATION ,

SUGGESTED POTENTIAL IRRIGATION *

▤ NEW DEVELOPMENT AREAS

▨ SUPPLEMENTAL DEVELOPMENT 1/

SUGGESTED POTENTIAL CLEARING *

▒ RELATIVELY COMPACT AREAS

░ SCATTERED AREAS

* Indication of areas on map neither implies detailed investigation nor assures development.

(3/B1) Upper figure keys area to subregional tabulation.

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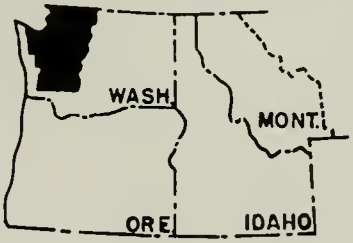

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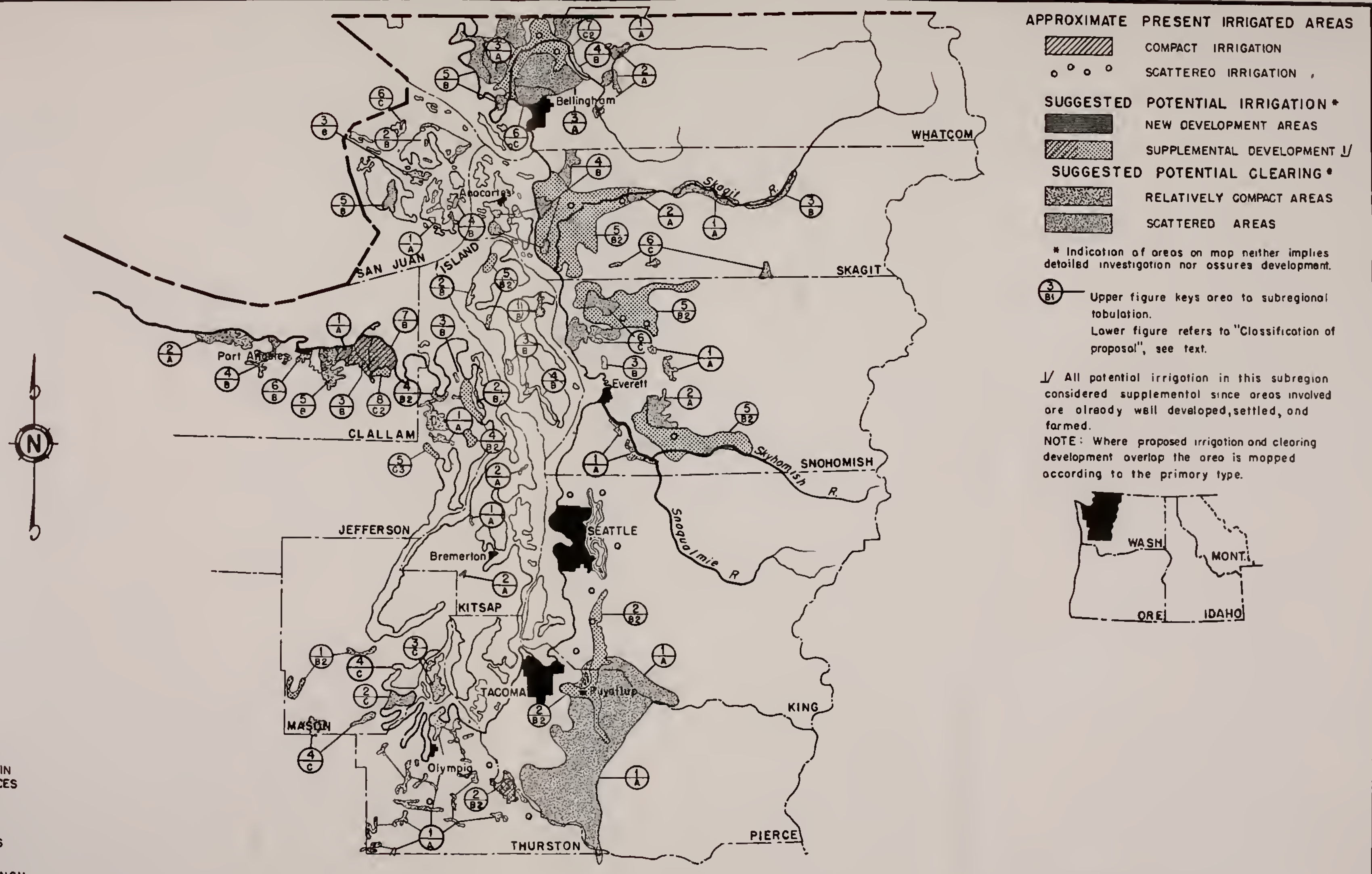
PUGET SOUND SUBREGION

RRIGATION & CLEARING

10 0 10 20 30

STATUTE MILES

1941


APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT 1/
SUGGESTED POTENTIAL CLEARING *
RELATIVELY COMPACT AREAS
SCATTERED AREAS
* Indication of areas on map neither implies detailed investigation nor assures development.
Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
1/ All potential irrigation in this subregion considered supplemental since areas involved are already well developed, settled, and farmed.
NOTE: Where proposed irrigation and clearing development overlap the area is mapped according to the primary type.
WASH.
MONT.
ORE.
IDAHO
N
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN ISLAND
Bellingham
Anacortes
Port Angeles
Everett
SEATTLE
Bremerton
TACOMA
Puyallup
Olympia
Skagit R.
Skykomish R.
Snoqualmie R.

PUGET SOUND SUBREGION

IRRIGATION & CLEARING

10 0 10 20 30
STATUTE MILES

1941

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BUREAU OF AGRICULTURAL ECONOMICS IN
COOPERATION WITH NATIONAL RESOURCES
PLANNING BOARD

SOURCES: MAPS AND REPORTS OF
BUREAU OF AGRICULTURAL ECONOMICS
WATER FACILITIES PROGRAM
WASHINGTON STATE PLANNING COUNCIL
COUNTY ENGINEERS
U. S. GEOLOGICAL SURVEY
WASHINGTON STATE COLLEGE
U. S. ARMY, CORP OF ENGINEERS
WASHINGTON STATE DEPT. OF
CONSERVATION AND DEVELOPMENT
IRRIGATION DISTRICTS
COUNTY LAND USE COMMITTEES

FIGURE 15

subregion but have been settled and improved for many years. The remaining drainage potentialities as a rule are of much lesser extent, lesser value, and involve greater costs. In fact, most will require a subsidy insofar as agriculture is concerned. Classification of drainage proposals is shown in the summary tabulation.

OREGON-WASHINGTON COAST

Acreage in Development Proposals

The Oregon-Washington coast subregion,[19] embodying a comparatively narrow strip between the Coast Range and the Pacific Ocean and extending from the northern tip of the Olympic peninsula to the southern boundary of Oregon, contains 207,680 acres that have been proposed for drainage or clearing development, or a combination of the two.

Of this total, 161,911 acres are primarily susceptible to clearing and 45,769 to drainage. In addition, however, as shown in the accompanying table, 24,948 of the acres proposed for drainage will require clearing as well, and 23,600 acres proposed for clearing will also require drainage.

It will be noted that no irrigation has been proposed. This is explained by the fact that irrigation is quite definitely of a supplemental character and consequently has not received much attention from investigators or promoters. Authoritative opinions indicate, however, that irrigation is a sound practice, as demonstrated by several operating systems, and should not be overlooked as a potentiality.

As is commonly the case in areas west of the Cascade Range, the chief purpose of a majority of proposed developments is to benefit present farms rather than to provide new ones, although the margin here is slim. Proposals primarily to expand the actual or effective size of existing farms total 104,006 acres while those to provide new farms total 103,674 acres.

For the subregion as a whole, new croplands to result from the prospective development probably approach 175,000 acres. This estimate includes all potential clearing and part of the drainage, especially that requiring diking. The remaining potential drainage concerns lands already in a restricted crop use.

A need for expansion and improvement of existing farms is indicated by recommendations of the Land Use Planning Committees. The Pacific County Committee points out that the current average amount of cleared land per farm is only 23 acres, and recommends that cleared land should embrace 40 to 75 acres. Thus, the average farm in the county needs at least 18 more cleared acres. The committee further believes there is opportunity for increasing size of farm business through improved drainage and suggests this can best be accomplished cooperatively.

Drainage proposals, as would be expected, are confined to stream valleys and tide flats, while much of the clearing is on upland soils adjacent to present cropland areas.

New Farm Possibilities

Even though a majority of development proposals are for the benefit of present farms, those not in this category will provide for about 1,800 additional family-sized units under present conditions. Of these, 182 are in connection with class A proposals, 1,388 are in class B, and 231 in class C. Over half of the total new farms are expected to result from new land clearing; proportionately, however, fewer will result from clearing than from drainage.

Under present conditions, it is not recommended that much, if any, subdivision of existing farms take place.

TABLE 7.—*Oregon-Washington coast subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	207, 680	104, 006	103, 674	1, 801
Class A	9, 361	2, 155	7, 206	182
Class B	160, 159	86, 911	73, 248	1, 388
Class C	38, 160	14, 940	23, 220	231
CLEARING				
Total clearing	161, 911	99, 571	62, 340	946
Class A	50 [4] (2, 770)	50 (500)	-------- (2, 270)	
Class B	125, 361 (20, 518	84, 621 (1, 790)	40, 740 (18, 728)	718
Class C	36, 500 (1, 660)	14, 900 (40)	21, 600 (1, 620)	228
DRAINAGE				
Total drainage	45, 769	4, 435	41, 334	855
Class A1	1, 556	500	1, 056	27
Class A2	7, 755	1, 605	6, 150	155
Class B1	5, 250 (23, 600)	1, 750 (17, 600)	3, 500 (6, 000)	86
Class B2	29, 548	540	29, 008	584
Class C2	1, 660	40	1, 620	3

[1] For detailed tabulation of projects see appendix, table 2.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

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[19] This subregion includes in Washington, all of Grays Harbor, Pacific, and Wahkiakum Counties and approximately that portion of Clallam and Jefferson Counties falling west of the Mount Olympus National Park; and in Oregon, all of Clatsop, Tillamook, Lincoln, Coos, and Curry Counties and the western tips of Douglas and Lane Counties.

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Total included in all proposals [3]	207,680	104,006	103,674	1,801
Class A	9,361	2,155	7,206	182
Class B	160,159	86,911	73.248	1,388
Class C	38,160	14,940	23,220	231
CLEARING				
Total clearing	161,911	99,571	62,340	946
Class A	50 [4] (2,770)	50 (500)	---------- (2.270)	
Class B	125.361 (20,518	84,621 (1,790)	40,740 (18,728)	718
Class C	36.500 (1,660)	14,900 (40)	21,600 (1,620)	228
DRAINAGE				
Total drainage	45,769	4,435	41,334	855
Class A1	1,556	500	1.056	27
Class A2	7,755	1.605	6,150	155
Class B1	5,250 (23,600)	1,750 (17,600)	3,500 (6,000)	86
Class B2	29,548	540	29,008	584
Class C2	1,660	40	1,620	3

[1] For detailed tabulation of projects see appendix, table 2.
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[19] This subregion includes in Washington, all of Grays Harbor, Pacific, and Wahkiakum Counties and approximately that portion of Clallam and Jefferson Counties falling west of the Mount Olympus National Park; and in Oregon, all of Clatsop, Tillamook, Lincoln, Coos, and Curry Counties and the western tips of Douglas and Lane Counties.

It is recognized, nevertheless, that industrial development and changes in economic conditions might conceivably precipitate a chain of events in which farm practices could be intensified and subdivision of present farms would become economic, thus providing for many more new farms than are estimated herein.

Probable Types of Farming and Sizes of Farms

Almost without exception, the predominant type of farming recommended is so-called "coastal dairying." In a number of favorably situated areas, truck farming is advocated in conjunction with dairying; in some cases farm livestock is suggested; and in a few localized peat bog areas, the most adaptable crop is cranberries.

A distinguishing feature of "coastal dairying" lies in its method of operation, which is largely a matter of summer dairying on grass. Putting up hay for winter feed can seldom be practiced because of the usual dampness and fog during haying season. Prevailing management practices take advantage of the long pasture season and anticipate a slack period during the winter months. Enough hay and grain are imported to supply minimum winter feeding needs.

The modifying influence of the ocean gives the region an even more equable climate than the valley areas of western Oregon and Washington. The average mean temperature for the region is about 50° F., and the average annual rainfall in the cropland areas probably approaches 80 inches.[20]

Predominant markets for dairy products of the coastal areas are creameries and cheese factories. Cheese manufactured at Tillamook is one of the best known local cheeses, while a number of the factories produce for a large national distributor.

"In spite of the fact that farming land is used almost entirely for grass pasture, the selling price is relatively high, generally ranging from $150 to $400 an acre."[21] Some cranberry lands in production are valued as high as $1,000 per acre.

The most commonly recommended size for coast dairy farms is 40 acres of cropland. This compares favorably with suggested sizes for dairying in the Puget Sound area.

Larger farms are advocated on upland soils than on the rich bottomlands. Although recommended cropland acres do not vary greatly between bottom and upland soils, the extent of other land required becomes much greater as less productive pastures become involved. A 40-acre dairy farm entirely on bottomland soils usually constitutes a family-sized unit. A farm partially or wholly on upland soils, to produce a comparable income, should contain 60 to 100 acres.

Truck farming and the production of cranberries in limited areas represent the most intensive uses suggested. Farms devoted to such uses can be successful on about 20 acres of suitable soils.

Farm woodlands in this area are of particular significance in agricultural planning and development. In the first place, timber generally is more easily established and growth is more rapid than in any other subregion. Second, the extent of cropland, both present and potential, is small as compared to the adjacent forest areas. Third, the nonplowable lands offer opportunity for alternative and complementary uses for forestry and livestock grazing. These features combine to emphasize the desirability of a farm-forest economy. But, because of lack of adequate physical and economic knowledge of the area, further study will be required before thoroughly effective planning for this use can be accomplished.

Classification of Proposals

Athough not the only factor limiting feasibility, cost of development is probably the most general. Clearing is usually much more difficult than in areas farther east and is estimated to cost over $200 an acre in certain localities. This is occasioned by the climate, which is favorable to very rapid growth of timber and underbrush, and by the existence of huge stumps. Drainage also is costly because of the high percentage of areas that will require diking.

A preponderance of proposals have been assigned B classifications. This is justified on the basis that trends in public subsidy and steadily improving methods of development promise to make costs a less serious limiting factor. Those projects carrying C classifications either involve costs that are considered exorbitant or have limitations of a more basic character, such as poor quality soil.

While irrigation as a means of land development has not been stressed by the land planning committees, there is evidence to indicate that supplementary irrigation is a sound practice, and many people feel that it will increase. Some authorities believe that dairy production, with no increase in acreages, could be increased 20 percent through irrigation of pasture lands. Up to the present, however, few farmers have been willing to place an additional financial burden on their lands until there is substantial evidence that increased profits will result.

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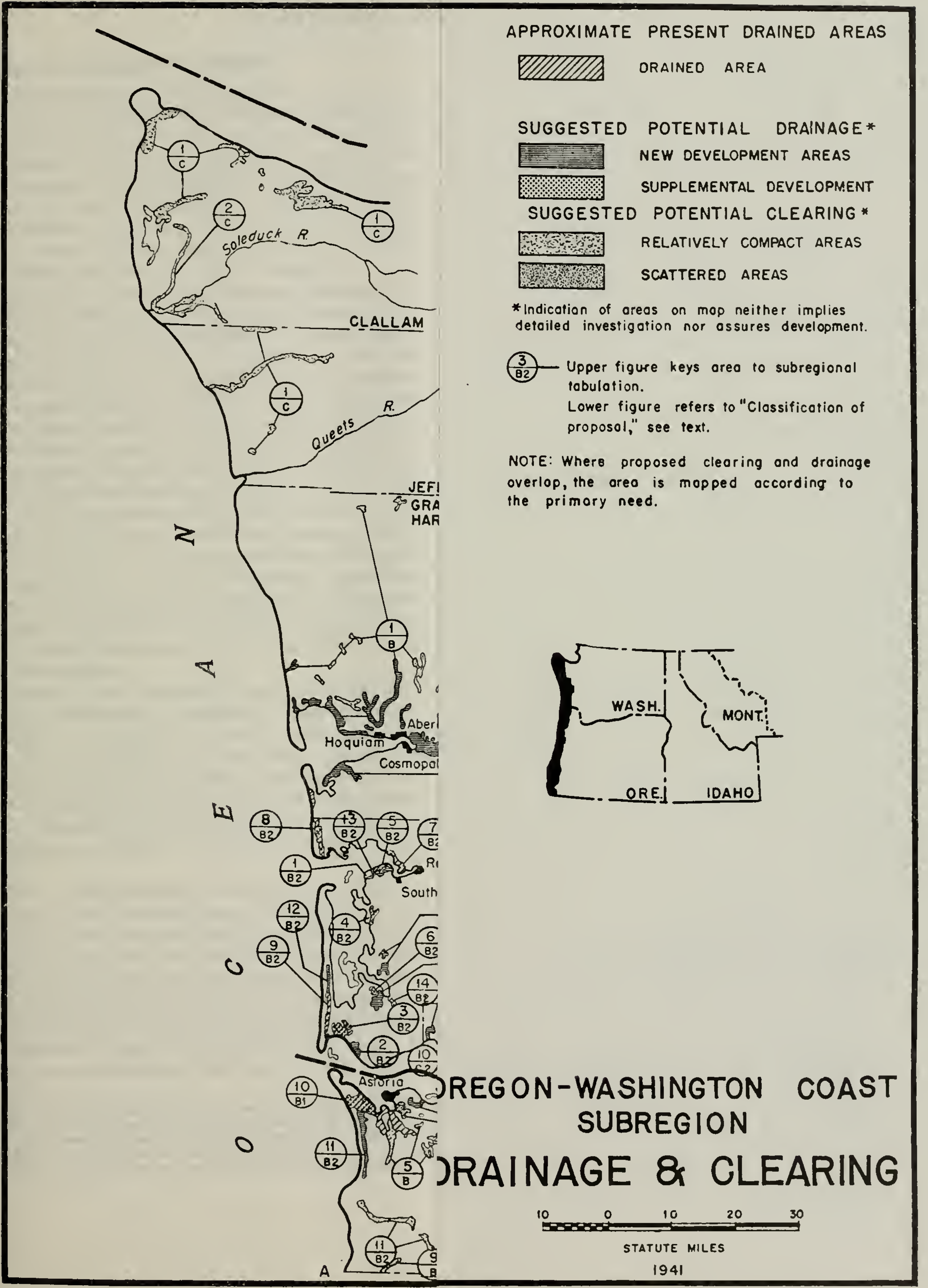
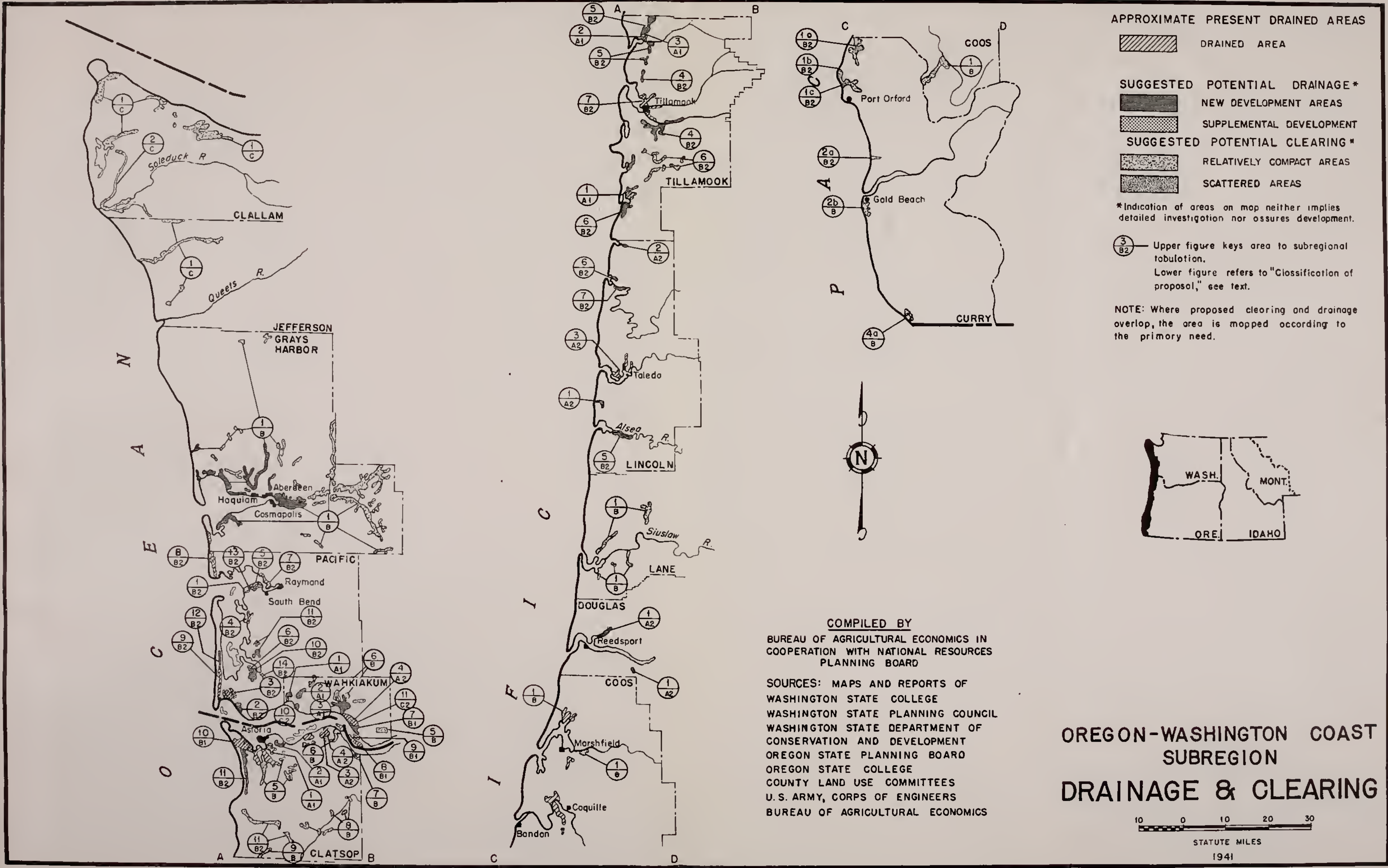
[20] For the Oregon section of this subregion the average mean temperature is 51° F. and the average rainfall is 78.09 inches. See Powers, W. L., et al., *Physical and Economic Geography of Oregon*, Oregon State System of Higher Education, 1940, p. 28.

[21] *Ibid.*, p. 62.


APPROXIMATE PRESENT DRAINED AREAS
▨ DRAINED AREA
SUGGESTED POTENTIAL DRAINAGE*
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL CLEARING*
RELATIVELY COMPACT AREAS
SCATTERED AREAS
*Indication of areas on map neither implies detailed investigation nor assures development.
3/B2 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.
NOTE: Where proposed clearing and drainage overlap, the area is mapped according to the primary need.
WASH.
MONT.
ORE.
IDAHO
O C E A N
Soleduck R.
Queets R.
CLALLAM
JEF
GRA
HAR
Aberl
Hoquiam
Cosmopol
South
Ri
Astoria
A
1/C
2/C
1/C
1/C
1/B
8/B2
13/B2
5/B2
7/B2
1/B2
12/B2
4/B2
6/B2
9/B2
14/B2
3/B2
2/B2
10/C2
10/B1
11/B2
5/B
11/B2
9/B
REGON-WASHINGTON COAST
SUBREGION
RAINAGE & CLEARING
10 0 10 20 30
STATUTE MILES
1941


APPROXIMATE PRESENT DRAINED AREAS
▨ DRAINED AREA
SUGGESTED POTENTIAL DRAINAGE*
■ NEW DEVELOPMENT AREAS
▒ SUPPLEMENTAL DEVELOPMENT
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3/B2 Upper figure keys area to subregional tabulation. Lower figure refers to "Classification of proposal," see text.
NOTE: Where proposed clearing and drainage overlap, the area is mapped according to the primary need.
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
WASHINGTON STATE COLLEGE
WASHINGTON STATE PLANNING COUNCIL
WASHINGTON STATE DEPARTMENT OF CONSERVATION AND DEVELOPMENT
OREGON STATE PLANNING BOARD
OREGON STATE COLLEGE
COUNTY LAND USE COMMITTEES
U. S. ARMY, CORPS OF ENGINEERS
BUREAU OF AGRICULTURAL ECONOMICS
OREGON-WASHINGTON COAST SUBREGION
DRAINAGE & CLEARING
10 0 10 20 30
STATUTE MILES
1941
PACIFIC OCEAN
CLALLAM
Soleduck R.
Queets R.
JEFFERSON
GRAYS HARBOR
Aberdeen
Hoquiam
Cosmopolis
PACIFIC
Raymond
South Bend
WAHKIAKUM
Astoria
CLATSOP
TILLAMOOK
Tillamook
Toledo
Alsea R.
LINCOLN
Siuslaw R.
LANE
DOUGLAS
Reedsport
COOS
Marshfield
Coquille
Bandon
Port Orford
Gold Beach
CURRY
N
WASH.
MONT.
ORE.
IDAHO
A
B
C
D

FIGURE 16

COWLITZ-WILLAMETTE SUBREGION

Acreage in Development Proposals

More pronounced in this subregion[22] than in any other, and particularly in the Willamette Valley, is the areal extent to which two or more types of proposed development overlap. The total area included in proposals amounts to nearly 1,134,000 acres, but the sum total of all acres recommended for each type of treatment amounts to about 1,619,000. In other words, nearly one-half million acres, as shown in table 8, will require more than one type of treatment.

Irrigation is by far the leading method proposed and comprises 781,800 acres. A great preponderance of this acreage is in the Willamette Valley. It should be remembered, however, that all irrigation in this subregional area, because of favorable climatic conditions, is of a supplementary character. That is, agriculture is by no means dependent on irrigation for its existence as is evidenced by the fact that a highly diversified and often a highly intensive system of agriculture has developed without the benefits of irrigation. On the other hand, there is considerable evidence to indicate that even greater crop production and diversification can be attained with the aid of supplemental water during the growing season. A number of sprinkler systems are now in operation; more are frequently recommended. In parts of the Willamette Valley, especially for the better drained bottomland areas, flood irrigation has been contemplated.

Drainage is also important, both as a need in itself and as a complement to irrigation. Areas specifically proposed for drainage as a need in itself total about 287,000 acres; in addition to this, nearly 265,000 acres will need drainage if irrigated. If the former acreage is not developed independently, the area needing drainage if irrigated (because of the high percentage of overlapping proposals) will increase to about 473,100 acres.

Many of the proposals relating strictly to drainage are not new, having been advocated for over 15 years, but there has been little development of them, partly because some of the lands are fairly productive in their present state and partly because the characteristics of certain soil types concerned are such that drainage is difficult and costs have been considered excessive.

Somewhat in excess of proposals shown herein, but only further emphasizing the broad need for drainage, are estimates that three-quarters of a million acres in the Willamette Valley will benefit by drainage development, of which a quarter of a million acres need community or drainage-district outlet ditches and another quarter of a million need flood protection.[23]

Land clearing for crop use as listed herein totals 271,800 acres:[24] however, it is realized that this figure is somewhat less than the actual potentialities. It is known that opportunities exist in every county of the subregion for scattered clearing of small patches now in farms, not so much to provide new farms as to expand the crop acres of present units. In some counties, an estimate of the extent of this type of development has been obtained, but in several no such estimate has been available.

Although most of the clearing potentialities are on upland or hill soils, especially in the Cowlitz Valley area, many opportunities in the Willamette Valley are in the flood plain of the river and involve the most productive soils of the valley. Improvement has been delayed because of the flood hazard, but upon completion of the current program of coordinated water development,[25] many of these unimproved lands can be converted to crop use with little cost except for clearing.

It will be noted that 126,000 acres of prospective clearing are located in Lewis County, Washington—the outstanding county in the Northwest in this respect.

Purpose of Development

Only 185,592 acres are primarily to provide new farms, while 948,350 acres or nearly 84 percent of all potentialities are proposed chiefly for the benefit of existing farms. It can be assumed, however, that improvements to intensify the use of cropland in existing farms will result in at least some subdivision of present holdings.

Considering that most development is to benefit present farms, it is not surprising that the prospective addition to present cropland is only about 275,000 acres—essentially equal to the amount of land proposed for clearing.

Farmer interest in current irrigation proposals is lacking in spite of the existence of many small farms and

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[22] The Cowlitz-Willamette Valley subregion includes all of Lewis, Cowlitz, Clark, and Skamania Counties in Washington; all of Multnomah, Clackamas, Marion, Linn, Polk, Benton, Yamhill, Washington, and Columbia Counties in Oregon; and all of Lane County, Oregon, except the portion lying between the Coast Range and the Pacific Ocean.

[23] Powers, W. L., et al., *op. cit.*

[24] In addition to the acreage shown for clearing to provide additional cropland, 105,000 acres have been suggested for partial clearing (slashing and burning) and seeding for pasture development. Such areas have been listed on the subregional tabulations but have not been considered in the totals.

[25] For further details of the coordinated water development plan refer to the Investigations of the U. S. Army Corps of Engineers embodied in House Document 544, *Willamette River and Tributaries*, March 1940.

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Farmer interest in current irrigation proposals is lacking in spite of the existence of many small farms and low incomes. It has been reported that 30 percent of all farms in the Willamette Valley are less than 20 acres in size and that 55 percent are under 50 acres.[26] Also 49 percent of all farms reported their gross value of crops at less than $600 per farm, and 64 percent reported less than $1,000.[27] An adjustment in "bookkeeping" to reallocate estimated development costs and reduce annual assessments to the farmer probably would go far in reversing farmer opinion.

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New Farm Possibilities

Additional farms likely to result from the proposed development, assuming no change in prevailing economic conditions, are estimated to total 4,018. Of these, 1,474 farms are in class A, 2,384 class B, and 160 class C. Except for 1,000 prospective farms in Lewis County, Washington, nearly all shown will depend on further development and subdivision of present farms. It will be noted that irrigation for the purpose of providing new farms is almost negligible. Nothwithstanding, over 2,000 farms are expected to result from inevitable subdivision consequent to development. Prospective drainage should yield about 350 new farms, and clearing about 1,650.

Over and above the number of new farms that might result from land improvement, many could be provided by subdividing those farms that in their present status of development are twice or more as large as they need be for adequacy. In Benton County alone it is estimated that about 150 more farms could be provided in this manner.[28] This seems contradictory to former statements concerning small farms. If an adjustment could be made wherein the deficiencies of the small farms could be supplied from the surpluses of the large ones, perhaps the ultimate result would not be an increase in the total number of farms. Practically, however, an increase would seem inevitable, inasmuch as many of the small farms are of a part-time character, and there is no interest in expanding.

In contrast to prospective farm figures compiled for this subregion, opinions of wide diversity have been expressed by various persons interested in agriculture. County agricultural agents, generally, are quite conservative and feel that potentialities for new farm lands are decidedly limited except in the cut-over areas of Washington. With regard to potentialities through subdivision, they feel that even where such opportunities exist, there is little likelihood of any action taking place because of the prevailing stability of ownership.

TABLE 8.—*Cowlitz-Wilamette Valleys subregion summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	1,133,942	948,350	185,592	4,018
Class A	202,982	89,250	113,732	1,474
Class B	863,220	808,320	54,900	2,384
Class C	67,740	50,780	16,960	160
IRRIGATION				
Total irrigation	781,800	780,000	1,800	2,015
Class A1	[4] (10,000)	(10.000)	…………	(75)
Class A2	1,000	1,000	…………	5
Class B1	714,000	714,000	…………	1,701
Class B2	34,700 [5] (2,000)	32,900 (2,000)	1,800	187
Class C2	32,100	32,100	…………	122
DRAINAGE				
Total drainage	80,342	37,850	42,492	354
Class A1	28,382 (1,500)	8,850 (1,500)	19,532	310
Class B1	7,000 (446,700)	1,000 (446,700)	6,000	6
Class B2	9,320 (15,000)	9,320 (2,000)	(13,000)	
Class C1	1,800	…………	1,800	20
Class C2	21,690 (9,900)	6,690 (9,900)	15,000	4
Class C3	12,150	11,990	160	14
CLEARING				
Total clearing	271,800	130,500	141,300	1,649
Class A	173,600 (3,000)	79,400	94,200 (3,000)	1,159
Class B	98,200 (6,700)	51,100 (4,900)	47,100 (1,800)	490

[1] For detailed tabulation of projects see appendix, table 3.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 5 below.
[4] This project, though under construction, is within a larger project not yet under construction. Figures are included in the larger project.
[5] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

On the other hand, a real estate man with considerable experience believes that farm population will double in the Willamette Valley in the next generation.

Probable Types of Farming and Sizes of Farms

Types of farms vary so widely in this subregion and are so closely related to soil productivity and crop adaptability that a brief review of these factors becomes vitally important.

In general, the cropland areas may be divided into two major physiographic regions: (*a*) comparatively level lowland areas of alluvial deposits occurring along river and stream valleys, and (*b*) rolling upland areas of weathered residual soils. The lowlands, especially in the Willamette Valley, may be further divided into recent alluvial soils (comprising the first and second bottomlands) and the old valley floor soils (comprising the first benchlands). The productivity and crop adaptability of the lowlands are definitely superior to those of the uplands.

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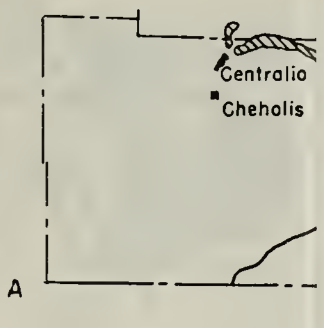
[26] Census of the United States, Oregon, 1940.
[27] *Ibid.*
[28] Baker, V. W. and Mumford, D. C., *Land Settlement in the Willamette Valley*, Station Bulletin 407, Oregon State College, June 1942, Table II.



APPROXIMATE PRESENT DRAINED AREAS

▧ DRAINED AREA

SUGGESTED POTENTIAL DRAINAGE * 1/

▩ NEW DEVELOPMENT AREAS

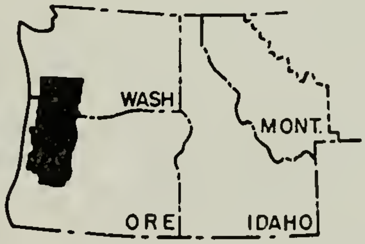
▨ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

$\frac{3}{B1}$ Upper figure keys area to subregional tabulation.

Lower figure refers to "Classification of proposal," see text.

1/ Even though potential drainage in most cases is designated as new, it is supplementary in the sence that it will improve lands already in a restricted crop use.



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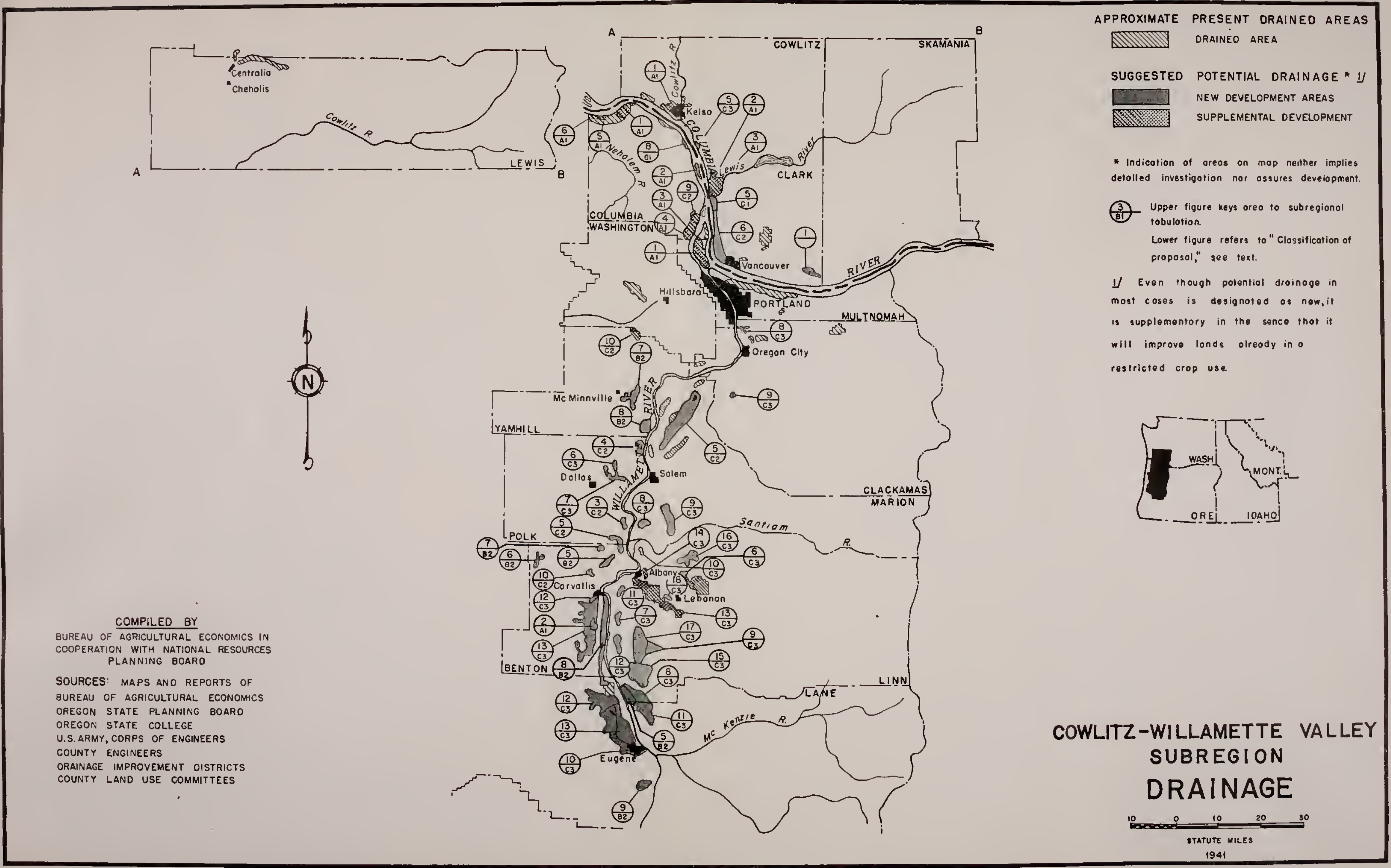
OREGON STATE COLLEGE
U.S. ARMY, CORPS OF ENGINEERS
COUNTY ENGINEERS
DRAINAGE IMPROVEMENT DISTRICTS
COUNTY LAND USE COMMITTEES

OWLITZ-WILLAMETTE VALLEY
SUBREGION
DRAINAGE

10 0 10 20 30

STATUTE MILES

1941



APPROXIMATE PRESENT DRAINED AREAS

▨ DRAINED AREA

SUGGESTED POTENTIAL DRAINAGE * 1/

■ NEW DEVELOPMENT AREAS

▩ SUPPLEMENTAL DEVELOPMENT

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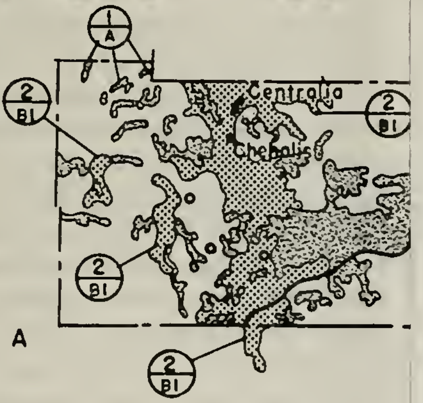
COUNTY ENGINEERS
DRAINAGE IMPROVEMENT DISTRICTS
COUNTY LAND USE COMMITTEES

COWLITZ-WILLAMETTE VALLEY SUBREGION DRAINAGE

1941

FIGURE 17



APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

○ SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION*

▤ NEW DEVELOPMENT AREAS

▒ SUPPLEMENTAL DEVELOPMENT 1/

SUGGESTED POTENTIAL CLEARING*

▓ RELATIVELY COMPACT AREAS

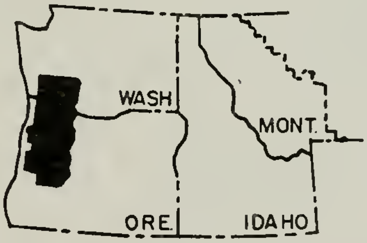
░ SCATTERED AREAS

*Indication of areas on map neither implies detailed investigation nor assures development.

(3/BI) Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.

1/ All potential irrigation in this subregion considered supplemental since areas involved are already well developed, settled and farmed.

NOTE: Most areas mapped for supplemental irrigation also involve widely scattered clearing.



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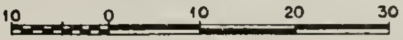
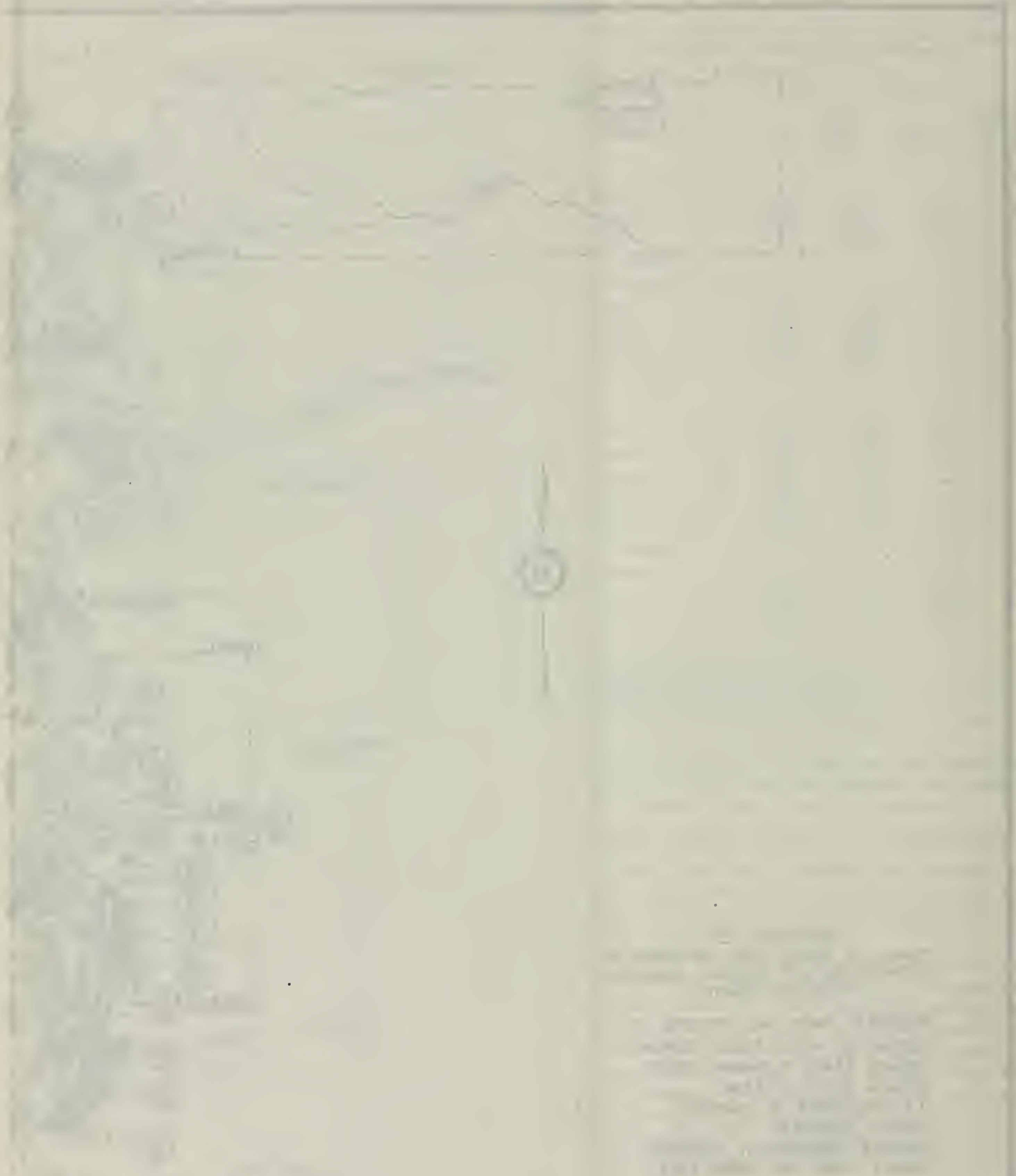
WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES
U. S. GEOLOGICAL SURVEY

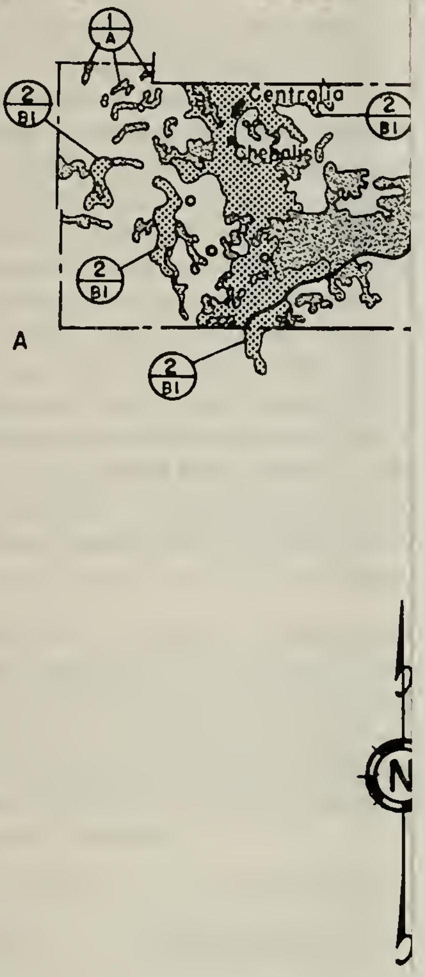
OWLITZ-WILLAMETTE VALLEY
SUBREGION
RRIGATION & CLEARING



STATUTE MILES

1941





APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

° °° ° ° SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION*

▤ NEW DEVELOPMENT AREAS

▒ SUPPLEMENTAL DEVELOPMENT [1]

SUGGESTED POTENTIAL CLEARING*

▓ RELATIVELY COMPACT AREAS

░ SCATTERED AREAS

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(3/B1)— Upper figure keys area to subregional tabulation.
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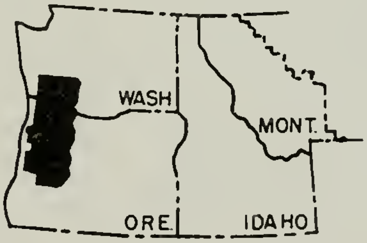

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WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES
U. S. GEOLOGICAL SURVEY

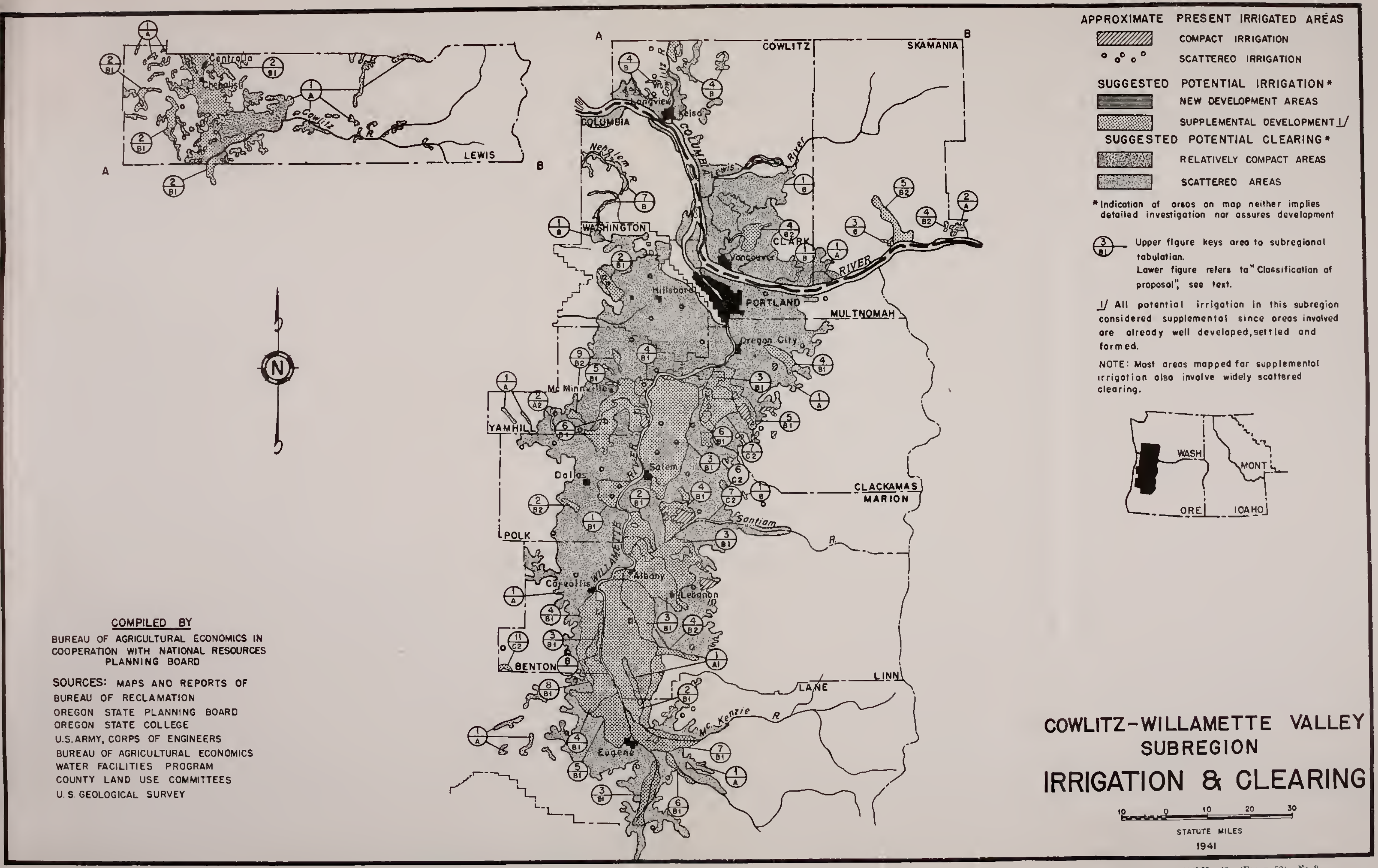
OWLITZ-WILLAMETTE VALLEY SUBREGION

RRIGATION & CLEARING

10 0 10 20 30

STATUTE MILES

1941


APPROXIMATE PRESENT IRRIGATED AREAS
▨ COMPACT IRRIGATION
° °° ° ° SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
▨ NEW DEVELOPMENT AREAS
▨ SUPPLEMENTAL DEVELOPMENT 1/
SUGGESTED POTENTIAL CLEARING*
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NOTE: Most areas mapped for supplemental irrigation also involve widely scattered clearing.
WASH
MONT
ORE
IDAHO
COWLITZ-WILLAMETTE VALLEY
SUBREGION
IRRIGATION & CLEARING
10 0 10 20 30
STATUTE MILES
1941
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
OREGON STATE PLANNING BOARD
OREGON STATE COLLEGE
U.S. ARMY, CORPS OF ENGINEERS
BUREAU OF AGRICULTURAL ECONOMICS
WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES
U.S. GEOLOGICAL SURVEY
N
A
B
Centralia
Chehalis
Cowlitz R
LEWIS
COWLITZ
SKAMANIA
Longview
Kelso
COLUMBIA
COLUMBIA
Lewis River
Nehalem R
WASHINGTON
CLARK
Vancouver
RIVER
Hillsboro
PORTLAND
MULTNOMAH
Oregon City
McMinnville
YAMHIL
Dallas
Salem
WILLAMETTE RIVER
CLACKAMAS
MARION
Santiam R.
POLK
Corvallis
Albany
Lebanon
BENTON
LINN
LANE
McKenzie R
Eugene

FIGURE 18

Considering the whole subregion, farm enterprises are highly diversified; however, it appears that the predominant single enterprise is dairying.

As a rule, physical limitations of topography, soil, and climate are the dominant factors determining types of farming; but here, climate can hardly be considered an important limiting factor since it is both mild and humid and is suitable for a wide range of crops.[29] Soils, however, are a limiting factor in certain localities.

In the Cowlitz Valley, recommendations relative to type of farming quite decidedly emphasize dairying. On the more productive soils, which usually are the bottomlands, dairying alone is recommended; while on the upland areas, it is suggested that poultry be added as a secondary enterprise. In localized areas, recommendations have been made for tree fruits, berries, general crops, livestock, and for a diversification of operation.

In the Willamette Valley, opinion is strongly favorable to as much diversification as the physical factors will permit.[30] An evaluation of the crop adaptability of Willamette Valley soils, as shown in table 9, has been worked out by the Oregon Agricultural Experiment Station [31] and provides the best available guide for recommended types of farming.

TABLE 9.—*Land classification of the Willamette Valley* [1]

Land class	Type of land	Land predominantly adapted for—
1	Recent alluvial deposit (Chehalis and Newberg soils).	Intensive crops such as vegetables, small fruits, hops, etc.
2	Old valley floor (largely Willamette soils).	General farming with limited production of intensive crops.
3	Old valley floor (largely Amity soils).	Hay, grain, and seed production.
4	Old valley floor (largely Dayton soils).	Pasture, with limited production of hay, grain, and seed.
1H and 2H	Upland or hill	Some fruit and general farming on better hill soils; pasture and extensive cropping in poorer hill lands.

[1] Adapted from Selby and Fryer, *op. cit.*, p. 3.

The importance of soil productivity is recognized in all recommendations for farm sizes; however, a noticeable difference of opinion has been expressed concerning proper sizes of farms within given classes of land. It is agreed that farms can be smallest on the class 1 lands and should be increased substantially as the range of crop adaptability decreases, but within a land class, recommendations vary widely.

The most recent and perhaps the best estimates of proper size of farms are those shown in table 10, which were developed recently by the Oregon Experiment Station and the BAE to classify farms in the valley as to adequacy. It is recognized that certain intensively cultivated truck, berry, or crop specialty farms may be somewhat smaller than the minimum shown below and still contain sufficient productive capacity to be adequate family-sized units.

TABLE 10.—*Adequate sizes of farms in the Willamette Valley, based on land adaptability classes* [1]

Land class	Predominant soil	Average range (minimum to maximum)	Average
1	Newberg and Chehalis	40–80	60
2	Willamette	60–120	90
3	Amity	80–160	120
4	Dayton	140–280	210
1H	Olympic and Melbourne	80–160	120
2H	Other hill	100–200	150

[1] Adapted from Vernon Baker, *op. cit.*, footnote 30.

At variance with the estimates shown in table 10, localized recommendations for size of farms on Newberg and Chehalis soils vary from 40 to 120 acres; likewise, estimates for Dayton soil vary from 100 to 450 acres.

A few suggested farm sizes have been based on type of farm alone, without specific reference to soils. These [32] state that intensive truck and orchard units should contain 15 to 20 acres, dairy units (15 cows) should include 40 to 60 acres, general farms 60 to 150 acres, and livestock farms 300 acres.

As in other subregions west of the Cascades, farm woodlands are important economic assets and, if properly managed, have possibilities of becoming even more important. The Columbia River, one of the three great log concentration points in the Pacific Northwest, bisects the subregion and is easily accessible from its extremities. In addition, there are numerous conversion plants along the Columbia and throughout the interior. Because of a rapidly expanding market, caution should be exercised to prevent overcutting of farm woodlands.

Classification of Proposals

Overlapping developments, as mentioned earlier, are characteristic of this subregion. In the Willamette Valley, there is a high percentage of overlap between irrigation and drainage, and sometimes clearing is in-

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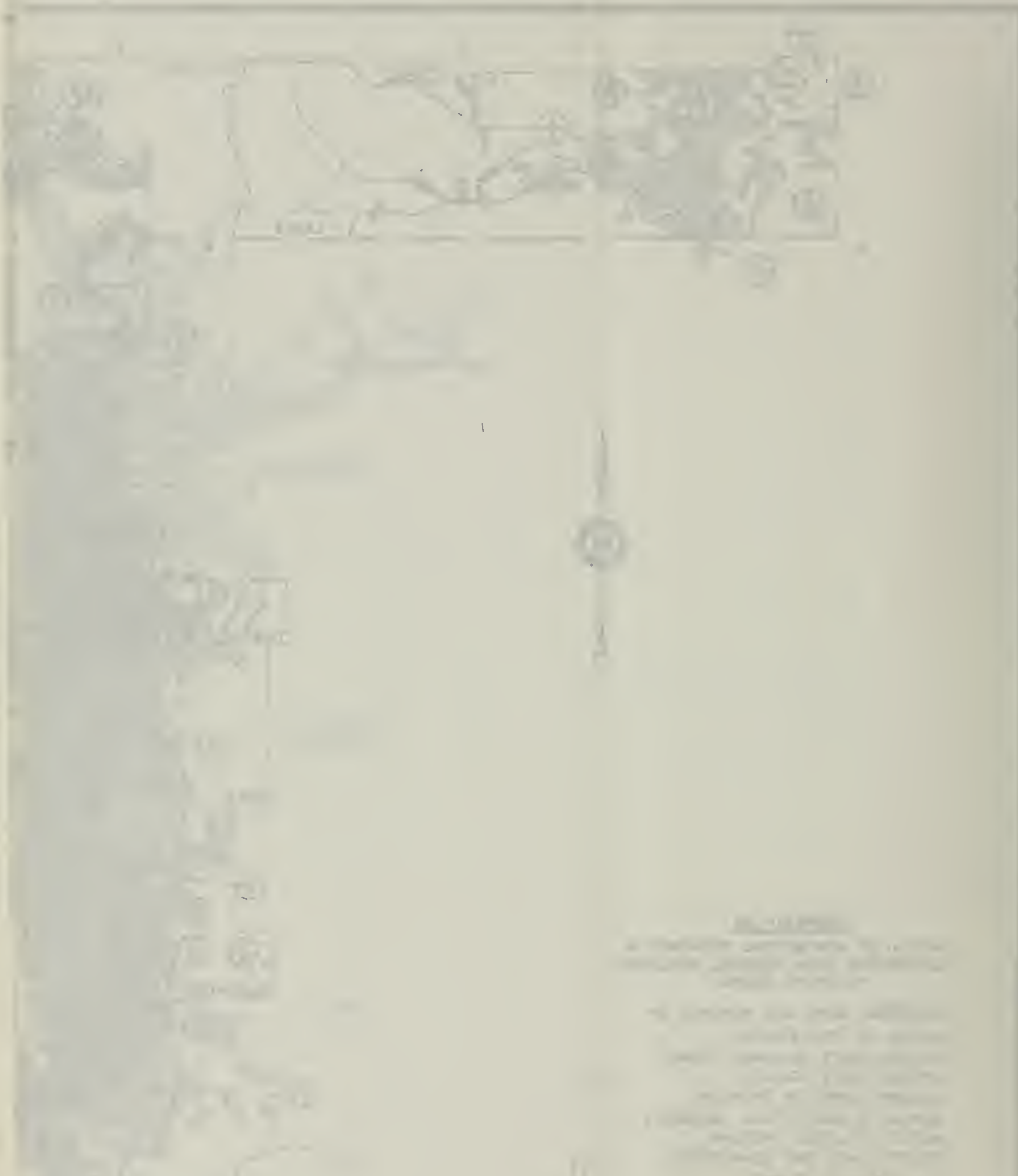
[29] The average annual rainfall is about 40 inches in the cropland areas although during the summer months it usually drops off to less than 2 inches. The range in temperature is very moderate and the frost-free growing season probably averages about 190 days.

[30] As reported by Vernon Baker, *op. cit.*, a recent study of farming types in the Williamette Valley reveals that of 333 farms surveyed, the predominant enterprise of 33 was orchard, 40 emphasized berries and truck, 71 dairying, 34 poultry, 25 general crops, 56 general livestock, 53 general purpose, and 21 specialty or part-time.

[31] Selby, H. E., and Fryer, Leland, *Willamette Valley Land Adaptability*, Oregon Experiment Station Circular No. 120, March 1937.

[32] Recommendations are based on early county land-use planning reports and probably do not have as technical or as up-to-date a basis as the suggested sizes shown in table 10.



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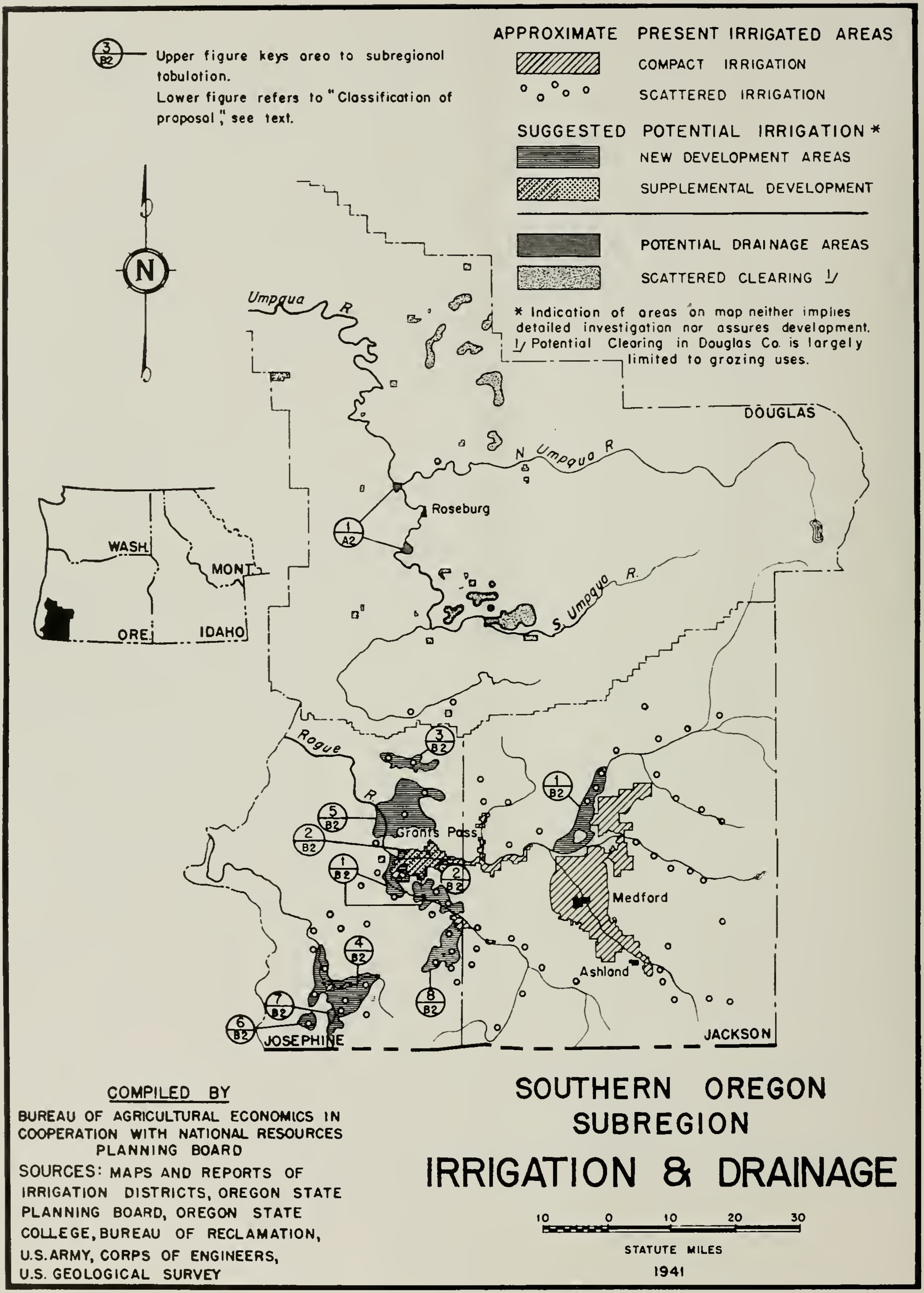
[31] Selby, H. E., and Fryer, Leland, *Willamette Valley Land Adaptability*, Oregon Experiment Station Circular No. 120, March 1937.

[32] Recommendations are based on early county land-use planning reports and probably do not have as technical or as up-to-date a basis as the suggested sizes shown in table 10.


3/B2 — Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.
APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
POTENTIAL DRAINAGE AREAS
SCATTERED CLEARING 1/
* Indication of areas on map neither implies detailed investigation nor assures development.
1/ Potential Clearing in Douglas Co. is largely limited to grazing uses.
N
WASH.
MONT.
ORE.
IDAHO
Umpqua R.
N. Umpqua R.
S. Umpqua R.
Rogue R.
DOUGLAS
Roseburg
1/A2
3/B2
1/B2
5/B2
2/B2
Grants Pass
1/B2
2/B2
Medford
4/B2
Ashland
8/B2
7/B2
6/B2
JOSEPHINE
JACKSON
COMPILED BY
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SOURCES: MAPS AND REPORTS OF IRRIGATION DISTRICTS, OREGON STATE PLANNING BOARD, OREGON STATE COLLEGE, BUREAU OF RECLAMATION, U.S. ARMY, CORPS OF ENGINEERS, U.S. GEOLOGICAL SURVEY
SOUTHERN OREGON SUBREGION
IRRIGATION & DRAINAGE
10 0 10 20 30
STATUTE MILES
1941

FIGURE 19

volved to make three types of development required on the same land. In the Cowlitz Valley area, drainage and clearing often overlap. Obviously, this multiple need means proportionately higher development costs which, in turn, directly affect feasibility. Naturally, the farmer whose lands are producing reasonably well without supplementary improvements is not likely to be very enthusiastic about costly proposals to irrigate or drain his farm until the economic value of such development has been proved.

These conditions explain, in part, the relatively low percentage of projects in class A categories and the farmers' general feeling of indifference toward irrigation and drainage at currently estimated costs to the farmer. Nevertheless, in view of present trends in public policy and improvements in methods of development, it seems inevitable that, in the course of time, the vast potentialities of this subregion will be developed. Estimates in this report, however, are not based on ultimate possibilities but rather on current practicalities and limitations.

Of the 781,800 acres proposed for irrigation, virtually none carry class A ratings, while over 90 percent fall into class B categories (mostly B1). This implies that the vast irrigation potentialities are not entirely feasible under present conditions and policies, but that the limiting factors are not considered fundamentally disqualifying or insurmountable.

Drainage classifications as shown in table 8 are somewhat misleading. Many areas of the Willamette Valley would benefit from drainage regardless of whether or not they are irrigated. Inasmuch, however, as irrigation has been proposed for most of the valley, the need for drainage has been shown as a complement to irrigation rather than as a need in itself. If it were not for the prospective irrigation and its interdependence on drainage, many drainage areas listed in the appendix tabulation would more properly have been rated in class A or B categories rather than in class C3.

Land-clearing potentialities, totaling 271,800 acres,[33] all carry A or B classifications. Since clearing, by its very nature, usually requires individual consideration of each tract involved, the classifications have necessarily been rather broad. Areas with strongly evident basic limitations, either physical or economic, have not been included as potentialities, thus accounting for the lack of class C proposals.

Of the areas shown, there is scarcely a proposal classified in a B category that is not partially worthy of a class A rating and vice versa. Ratings necessarily are based on the predominating circumstances.

To show more accurately the feasibility of clearing as well as other potentialities would require detailed surveys of all areas. In the absence of these, the purpose herein is to assign classifications that will assist in coordinating a program for further detailed investigation.

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[33] See footnote 24, p. 49.

SOUTHERN OREGON SUBREGION

Acreage in Development Proposals

Areas in the southern Oregon subregion[34] proposed for development by one or more of the several means (irrigation, drainage, and clearing) aggregate 66,420 acres. About one-half of the acreage involved will require more than one type of treatment.

Irrigation is the outstanding potentiality and embraces 63,920 acres. The only proposal in which irrigation is not the primary requirement applies to two small areas along the Umpqua River bottoms where the deficiencies of rainfall are less pronounced.

The prevailing stress on irrigation derives from a rather significant difference between this and other subregions west of the Cascade Range. In the others, irrigation is of a supplementary character, providing for improvement of lands already in fairly intensive cultivation; here, it constitutes a more fundamental requirement of agriculture, especially in areas of lesser rainfall, and plays a greater role in determining land use.

Land clearing will be required on 32,115 acres but cannot be thought of as a need in itself, inasmuch as it is all complementary to irrigation.

Drainage proposals as shown herein total only 2,500 acres and are confined to comparatively small areas along the Umpqua River near Melrose and Winston. In addition, judging from the soil characteristics of certain areas, it seems likely that some drainage facilities will be desirable in conjunction with the proposed irrigation. In view of the interrelationship, drainage needs should be anticipated and provided for as an integral phase of irrigation development.

The primary object of most of the proposed development is to benefit existing farms. Nevertheless, if the developments are carried out under present conditions, nearly half of the total acres involved can be used to provide new farms.

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[34] The southern Oregon subregion includes Jackson and Josephine Counties, and all of Douglas County except its coastal tip.

New cropland to result from the prospective development will be limited, for the most part, to that recommended for clearing.

It will be noted that the acreages proposed for clearing and the acreages to provide for new farms are nearly equal. This indicates that new farms generally will be depedent on development of new lands requiring both clearing and irrigation, and that benefits to present farms will be largely in the nature of improvement of present croplands by means of new or improved irrigation.

New Farm Possibilities

Development, if carried out as currently proposed, is expected to provide suitable opportunities for about 879 new farms. All of these are dependent on irrigation proposals rated in class B. Recommendations indicate that most new farms should result from the development of new croplands, but agree that if certain localities now in dry farming were irrigated, a number of new farms could well be provided by subdivision of the larger ownerships.

Probable Types of Farming and Sizes of Farms

Recommended types of farming center quite decidedly around dairying, with farm livestock and truck farming advocated as complementary enterprises. These recommendations are governed more by economic conditions than by physical limitations, inasmuch as this subregion with its moderate climate and fair amount of rainfall[35] is well adapted to a wide range of crops, especially under irrigation.

Present farming enterprises include considerable fruit growing, particularly pears. The fruit industry, however, has been seriously affected here, as well as elsewhere, by its loss of foreign markets.

Recommendations concerning proper sizes of irrigated farms in the potential areas range from 50 to 80 acres with 30 to 60 in crops. These sizes are somewhat in excess of present farms in the older established areas. Many intensively farmed truck and berry units contain less than 20 acres, but farms this small are not recommended except under especially favorable circumstances.

Development proposals along the bottomland areas of the Umpqua River, where rainfall is greater and irrigation not necessary, suggest that truck and dairy farming can be successfully practiced on units of about 40 acres, all in crop.

TABLE 11.—*Southern Oregon subregion—summary of proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals[3]	66,420	34,420	32,000	879
IRRIGATION				
Total irrigation	63,920	31,920	32,000	879
Class B2	63,920	31,920	32,000	879
DRAINAGE				
Total drainage	2,500	2,500	-----	-----
Class A2	2,500	2,500	-----	-----
CLEARING				
Class B	[4] (32,115)	(4,095)	(28,020)	-----

[1] For detailed tabulation of projects see appendix, table 4.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

Factors of location with respect to markets and transportation facilities and variations in annual costs of development to the farmer will play a large part ultimately in determining sizes and types of farms. In any development, however, consideration should be given to preserving and improving farm woodlands and to establishing an effective program of complementary use of land for forestry and livestock. In the northern end of this subregion, the farm woodland problem is principally one of organization and management for markets which, though limited in the past, give promise of substantial expansion in the relatively near future.

Classification of Proposals

All irrigation proposals have had some technical surveys which, even though of a reconnaissance nature, give sufficient evidence of feasibility to indicate that the areas are worthy of more detailed investigation. Consequently, the Bureau of Reclamation for some time now has been making a detailed study of the Rogue River basin. A report of its findings will probably be available soon after completion of current field work and will give a comprehensive portrayal of this basin's potentialities.

The Umpqua River developments which have been investigated by the Corps of Engineers under the Flood Control Act are considered "to be desirable improvements and economically justified."[36]

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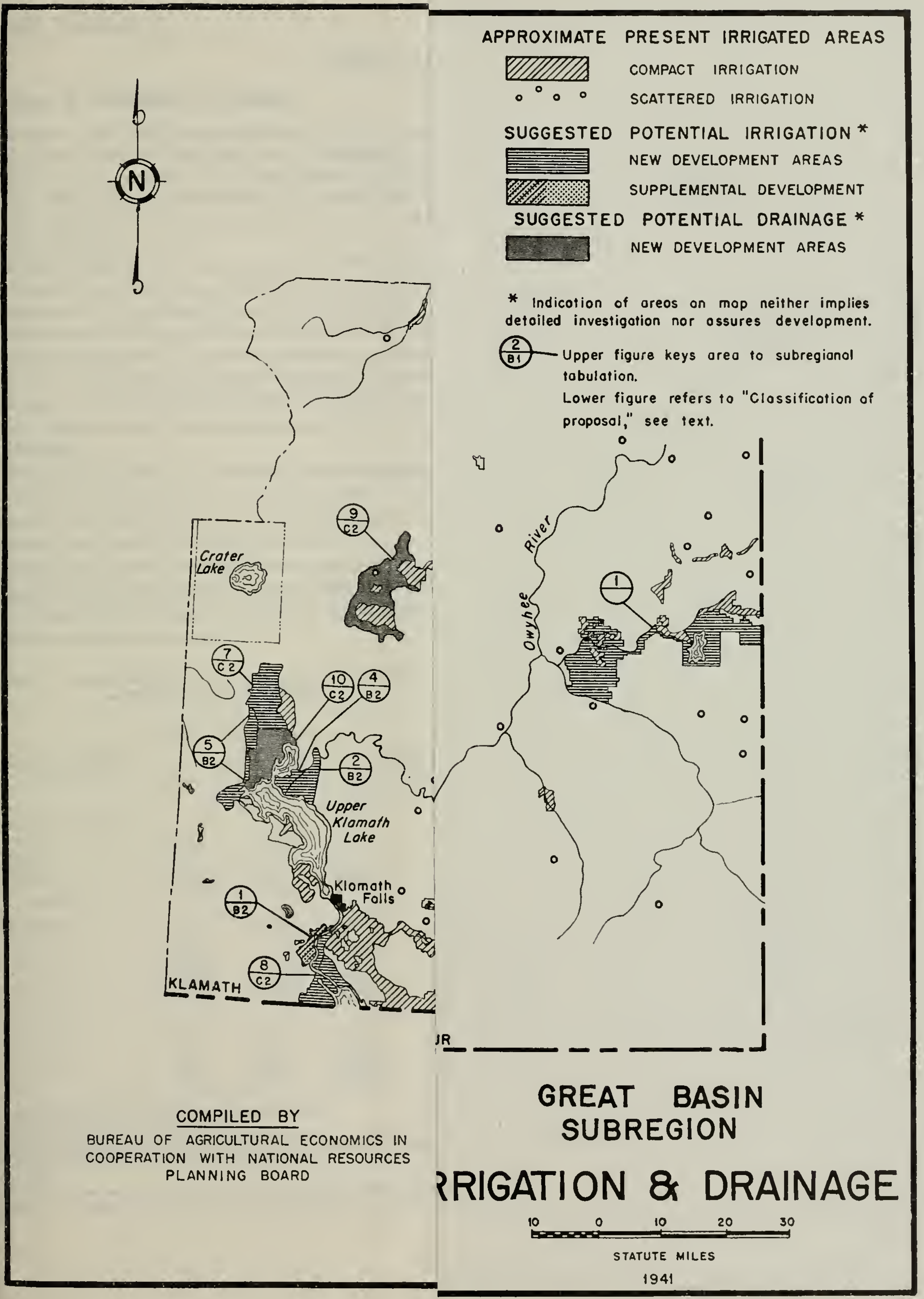
[35] Annual rainfall is 20 inches at Medford but increases in all directions from this point. Temperatures in the Rogue River Valley average 53° F. but range from −10° F. to 110° F. See Powers, W. L., et al., *op. cit.*

[36] *Umpqua River and Tributaries, Oregon*, letter from Secretary of War to House of Representatives, 76th Congress, Document No. 684. 1940.


APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL DRAINAGE *
NEW DEVELOPMENT AREAS
* Indication of areas on map neither implies detailed investigation nor assures development.
2 / B1
Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.
N
9 / C2
Crater Lake
Owyhee River
1
7 / C2
10 / C2
4 / B2
5 / B2
2 / B2
Upper Klamath Lake
Klamath Falls
1 / B2
8 / C2
KLAMATH
UR
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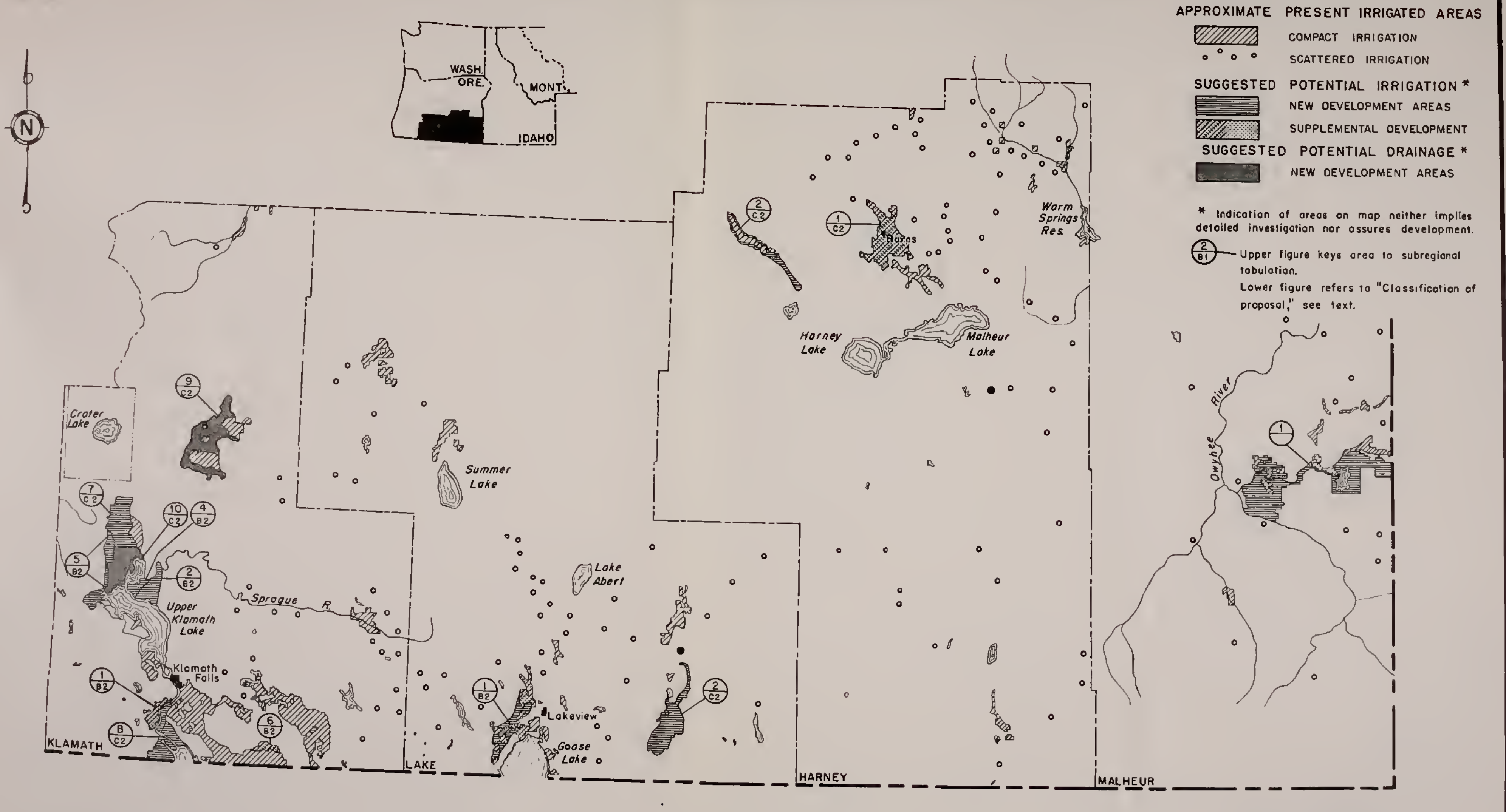
GREAT BASIN SUBREGION
RRIGATION & DRAINAGE
10 0 10 20 30
STATUTE MILES
1941



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BUREAU OF AGRICULTURAL ECONOMICS IN
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PLANNING BOARD

SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
OREGON STATE PLANNING BOARD
OREGON STATE COLLEGE
BUREAU OF AGRICULTURAL ECONOMICS
INDIAN SERVICE
COUNTY LAND USE COMMITTEES

GREAT BASIN SUBREGION
IRRIGATION & DRAINAGE

10 0 10 20 30
STATUTE MILES
1941

FIGURE 20

GREAT BASIN SUBREGION

Acreage in Development Proposals

Proposals for land improvement in the Great Basin subregion [37] total over 187,000 acres. Irrigation is involved in all proposals and is the primary need for nearly 128,000 acres. Drainage is the primary need for 59,500 acres and is secondary to irrigation on an additional 4,330 acres.

Partially reflected in these estimates are the characteristics of the whole area; namely, that irrigation is fundamental to satisfactory crop growth, and that in order to control soil moisture adequately, drainage often is equally important. For some proposals, irrigation has been shown as the primary need, while for others, drainage. Obviously, the dividing line is hard to define where irrigation and drainage assume an interdependent relationship.

The primary objective of suggested land development is to benefit present farms. As table 12 shows, 118,270 acres are for this purpose, while only 69,210 acres are primarily to provide for additional farms.

New lands to be converted to crop use through the suggested improvements are comparatively few. The chief result will be improvement of present lands to permit a more intensive use.

TABLE 12.—*Great Basin subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	187,480	118,270	69,210	688
Class A				
Class B	52,180	17,270	34,910	284
Class C	135,300	101,000	34,300	404
IRRIGATION				
Total irrigation	127,980	88,270	39,710	559
Class B2	40,680 [4] (11,500)	17,270	23,410 (11,500)	245
Class C1	30,000	30,000		70
Class C2	57,300 (48,000)	41,000 (30,000)	16,300 (18,000)	244
DRAINAGE				
Total drainage	59,500	30,000	29,500	129
Class B2	11,500 (4,330)	 (2,500)	11,500 (1,830)	39
Class C2	48,000	30,000	18,000	90

[1] For detailed tabulation of projects, see appendix, table 5.
[2] For definition of various classes, see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

New Farm Possibilities

If all development proposals were considered economic under present conditions, about 688 new farms could be provided. None of these is in connection with class A proposals, 284 fall in class B categories, while 404, or nearly 60 percent, are in class C.

In areas already well improved, a considerable number of new farms could be provided through subdivision alone, no further development being required. Such opportunities comprise an important aspect of future settlement but are outside the scope of this inventory, and, consequently, are only mentioned.

Probable Types of Farming and Sizes of Farms

Livestock is the principal basis for agriculture in the Great Basin area. Lack of water is such a limiting factor in much of the region that agriculture is confined to grazing range livestock on native grasses. Where surface or ground water is available for irrigation, the recommended type of farming shifts somewhat to more intensive operations involving farm livestock, dairying, and cash crops. The best adapted cash crops under the prevailing short growing season seem to be potatoes and small seeds and are recommended for many farming areas in Klamath County and for some in Lake County.

Sizes of farms, existing and recommended, are generally large. Though irrigation is involved in all proposals, it seldom applies to the whole cropland acreage per farm, nor would it provide a full water requirement for crops other than those suggested.

In Klamath County, where water is less of a problem than elsewhere in the subregion and where some diversity, including dairying, farm livestock, and specialty cash crops, is contemplated in recommended types of farming, the suggested sizes vary from 80 to 500 acres of cropland. In the case of farm livestock alone, 1,000-acre units are suggested. These sizes, generally, do not contemplate the use of range lands in addition but do include sizable proportions of pasture within the units.

In Lake and Harney Counties, where range livestock is emphasized, the variation in cropland recommendations is not so pronounced, ranging from 100 to 210 acres, and the use of adjacent grazing lands is definitely involved even though the extent of this use and the availability of the land have not been indicated.

Within these ranges, it would seem that the average general farm should embrace not less than 100 acres, and in the case of dairy farms, the resources should be sufficient to support at least 20 cows. Although grass is probably the basic natural resource of the area, its

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[37] This subregion is entirely in Oregon and includes Klamath, Lake, Harney, and about the southern two-thirds of Malheur Counties.

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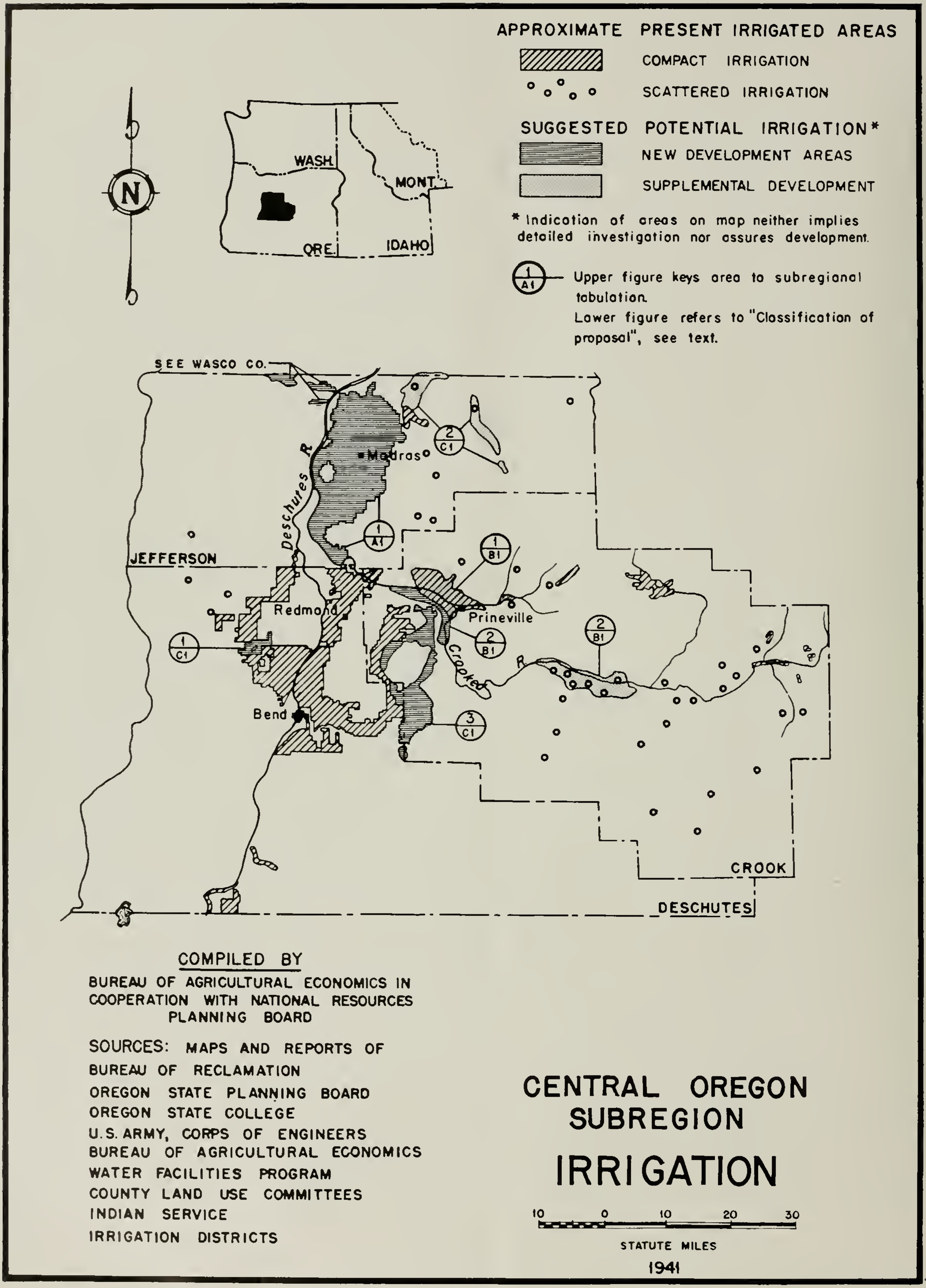
[37] This subregion is entirely in Oregon and includes Klamath, Lake, Harney, and about the southern two-thirds of Malheur Counties.


APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
* Indication of areas on map neither implies detailed investigation nor assures development.
1/A1 Upper figure keys area to subregional tabulation. Lower figure refers to "Classification of proposal", see text.
N
WASH.
MONT.
ORE.
IDAHO
SEE WASCO CO.
Madras
Deschutes R.
JEFFERSON
Redmond
Prineville
Crooked R.
Bend
CROOK
DESCHUTES
2/C1
1/A1
1/B1
2/B1
1/C1
3/C1
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OREGON STATE COLLEGE
U.S. ARMY, CORPS OF ENGINEERS
BUREAU OF AGRICULTURAL ECONOMICS
WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES
INDIAN SERVICE
IRRIGATION DISTRICTS
CENTRAL OREGON SUBREGION
IRRIGATION
10 0 10 20 30
STATUTE MILES
1941

Figure 21

carrying capacity is low and probably would require 4 to 5 acres per animal unit per month during the grazing season. On this basis, 100 range cattle for an 8-month grazing season would require from 3,200 to 4,000 acres of range. The availability of suitable additional range land for any expansion of present operations is highly questionable.

Classification of Proposals

Perhaps the most significant disclosure of the classification in this subregion is that over 72 percent of all acres in proposals fall into deferred categories. Probably the most important limiting factor is lack of water, although in certain areas of Klamath County, water is somewhat less of a problem, but here, limitations of the growing season and existing economic patterns contribute to a deferred classification.

The remaining 28 percent of lands in proposals have been given B2 ratings, which indicates that limiting factors are prevalent but are not considered prohibitive to development.

CENTRAL OREGON SUBREGION

Acreage in Development Proposals

In the Central Oregon subregion,[38] suggestions for improvement of arable land total 107,300 acres. All contemplate irrigation. Drainage is not a problem, and clearing potentialities do not exist except to a limited extent for part-time farming in the hills along the Metolius River.[39]

Climatic and soil limitations make irrigation of fundamental importance to virtually all crops except wheat and grass. Annual rainfall will vary in the cropland areas of the subregion but probably will average from 10 to 20 inches. Soils, generally, are rather light textured and occur over a porous disrupted lava rock. These conditions make for rapid drainage and intensify the need for irrigation. Care must be exercised to avoid loss of fertility through too much irrigation.

Of the gross acres suggested for irrigation, 22,900 would benefit present farms by providing more water to supplement current deficiencies, while 84,400 would comprise new irrigation primarily for new farms. These figures are somewhat misleading unless considered in light of the estimate that over 30,000 acres are not considered feasible for development under present conditions.[40]

New Farm Possibilities

Nearly 1,000 new farms are likely to result from the potentialities of this subregion. Of these, 270 are dependent on class C proposals and must be considered as remote possibilities. On the other hand, the estimate of 665 new farms in connection with the North unit Deschutes project, a class A potentiality,[41] is conservative. Class B farms total only 59.

Probable Types of Farming and Sizes of Farms

Type of farming recommendations center predominantly around livestock, and involve range stock, feeder stock, and dairy stock. General crop farming is also desirable where conditions permit.

In Crook County, the general recommendation is that a cash crop should be sold in addition to livestock and livestock products. Deschutes and Jefferson counties lean a little more toward general crops for irrigated areas, maintaining, however, a strong place for livestock and their products.

Principal crops in the areas concerned are hay, grain, small seeds, and potatoes, with hay predominating.

Wheat is important in present farming operations

TABLE 13.—*Central Oregon subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	107,300	22,900	84,400	994
Class A	50,000		50,000	665
Class B	22,800	16,900	5,900	59
Class C	34,500	6,000	28,500	270
IRRIGATION				
Total irrigation	107,300	22,900	84,400	994
Class A1	50,000		50,000	665
Class B1	22,800	16,900	5,900	59
Class C1	34,500	6,000	28,500	270

[1] For detailed tabulation of projects see appendix, table 6.
[2] For definition of various classes see p. 38.

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[38] This subregion includes the three counties of Jefferson, Deschutes, and Crook.

[39] Part-time farming is not considered in this inventory inasmuch as it is a problem in itself and usually occurs in areas already developed.

[40] Refer to tabulations and discussion under "Classification of Proposals."

[41] This project is now under construction by the U. S. Bureau of Reclamation. Information in its regard can be obtained through that agency or from the County Agricultural Agent in Madras, Oreg.

but will become relatively less important as development takes place in areas proposed for irrigation. Most of the land to be watered under the North unit Deschutes project has been in dry-land wheat for many years.

Recommended sizes of farms indicate that self-contained farms usually should comprise 80 to 100 acres, all of which should be cropland and most of which should be under irrigation. This applies principally to general farms with a limited range of diversification. Broad recommendations have indicated that an irrigated farm, well diversified and favorably situated, might be adequate with about 60 crop acres, while a similar type of farm in a poorer locality should be double this size.

Farms more predominantly devoted to range livestock depend on range lands outside their headquarters unit for spring, summer, and fall grazing. Forest grazing lands are allotted by permit for this purpose. Other lands are leased privately or grazed under the Taylor Grazing Act. It should be emphasized, however, that available range land is scarcely adequate even for existing ranch units and certainly would not allow for much expansion of this type of operation.

Sizes of farms in the North-unit[42] project are set by law but were derived from prior research investigations. Size limitations permit 40 acres per person or 80 acres per family. Present farming is largely confined to dry-land wheat and is organized in large units, often comprising upwards of a thousand acres, especially when farmed with a tractor.

Classification of Proposals

Nearly half of the total acreage involved in development proposals is contained in the North-unit project, which is now under construction and accordingly has been given a class A1 rating. The area of the original proposal, which was more or less promotional, included well over twice the acreage now being developed. Poorer lands have been sorted out.[43]

Both proposals classed as B1 are dependent on construction of the Post Falls reservoir.

Class C proposals are considered remote possibilities largely because suitable means of providing water are lacking.

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[42] It is interesting to note that most of this area has domestic water piped under pressure to every farm. There is no comparable example of this in the Northwest and possibly none anywhere else in the country.

[43] It is the opinion of some persons who have been consulted that the 50,000 acres shown herein should be reduced to about 40,000 acres.

BLUE MOUNTAIN SUBREGION

Acreage in Development Proposals

Approximately 213,000 acres in the Blue Mountain subregion[44] have been proposed for agricultural development.

Inasmuch as the climate[45] of the area is characterized by hot, dry summers, it is natural that all proposals should involve irrigation. In only one case is irrigation not shown as the primary need, and in that instance, it is considered highly important as a supplementary feature even though the system contemplated is simply one of water spreading for pasture and meadow improvement.

To control soil-moisture adequately, particularly in the old valley floor areas which contain fine textured soils with impeded drainage, a combination of drainage with irrigation is frequently required. Though drainage to the extent of 40,000 acres has been indicated as a necessary complement to irrigation, detailed investigations may reveal a much broader need. Drainage of this character should be considered an integral part of irrigation; and the two should be developed concurrently.

Clearing proposals are limited to scattered tracts of potential hay meadows and aggregate 9,000 acres. In conjunction with the meadow development an inexpensive water spreading system is planned.

About 113,500 acres of the proposed irrigation would chiefly benefit farms that are already improved but which are inadequately supplied with water; the remaining 90,550 acres would become available for new farms. It should be noted, however, that of this latter figure, classification of 80,000 acres has been withheld pending results of current surveys.

New Farm Possibilities

If all proposals were economically feasible and could be carried out under prevailing conditions, provision probably would be made for over 1,000 new family-sized farms, in addition to stabilizing many existing farms.

Of the new farms, only 23 are rated in class A, 130 in class B, and 85 in class C, while 800 are not classified. Obviously, the number of new farms actually to mate-

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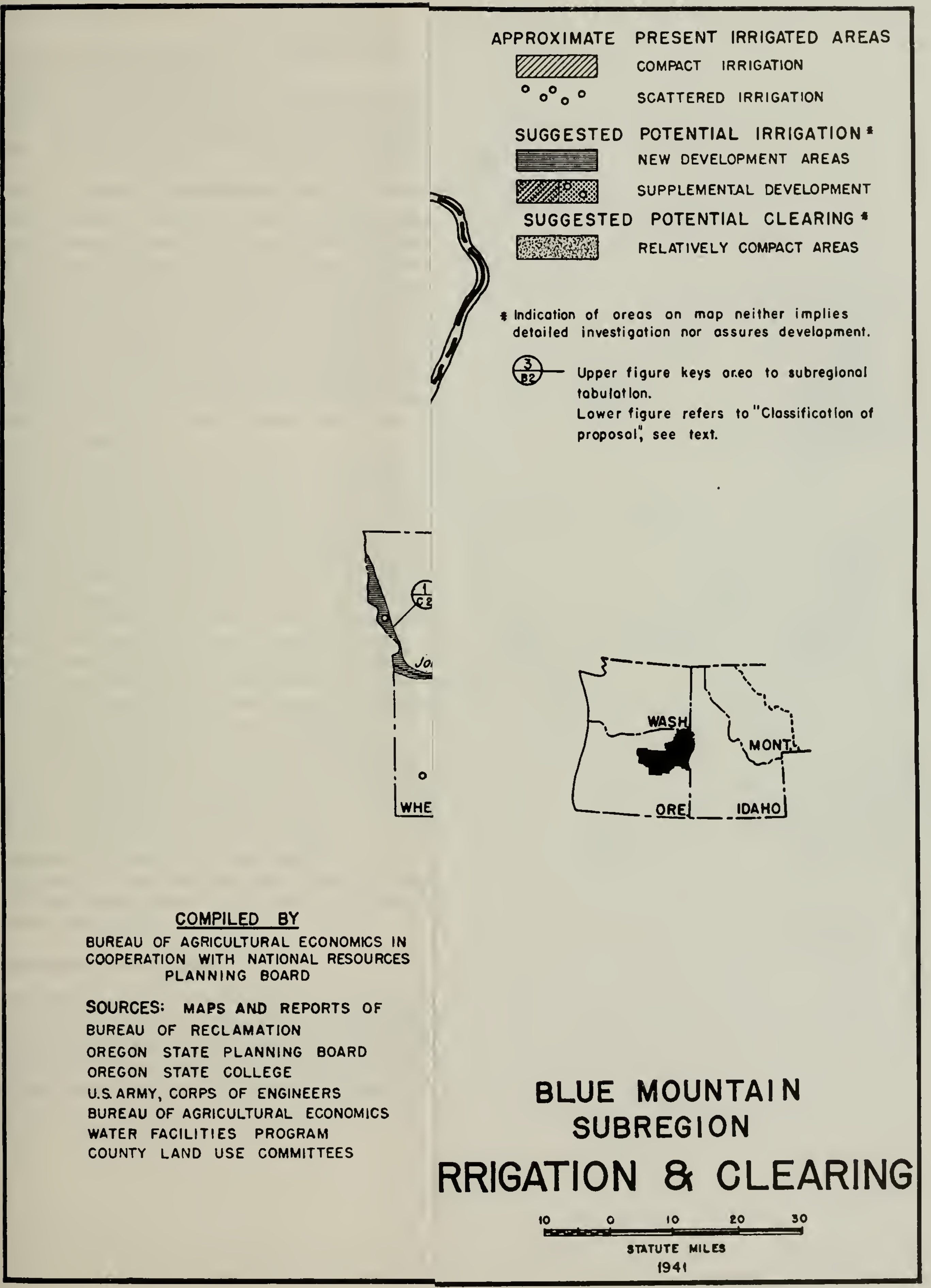
[44] The Blue Mountain subregion contains Wheeler, Grant, Baker, Union, and Wallowa Counties.

[45] Annual precipitation over the subregion averages from 10 to 20 inches in the cropland areas. Winters are cold, accompanied by considerable snowfall in the mountain areas.



APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

° °° ° ° SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION *

▤ NEW DEVELOPMENT AREAS

▨ SUPPLEMENTAL DEVELOPMENT

SUGGESTED POTENTIAL CLEARING *

▒ RELATIVELY COMPACT AREAS

* Indication of areas on map neither implies detailed investigation nor assures development.

3/B2 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.

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WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES

BLUE MOUNTAIN SUBREGION

RRIGATION & CLEARING

STATUTE MILES

1941

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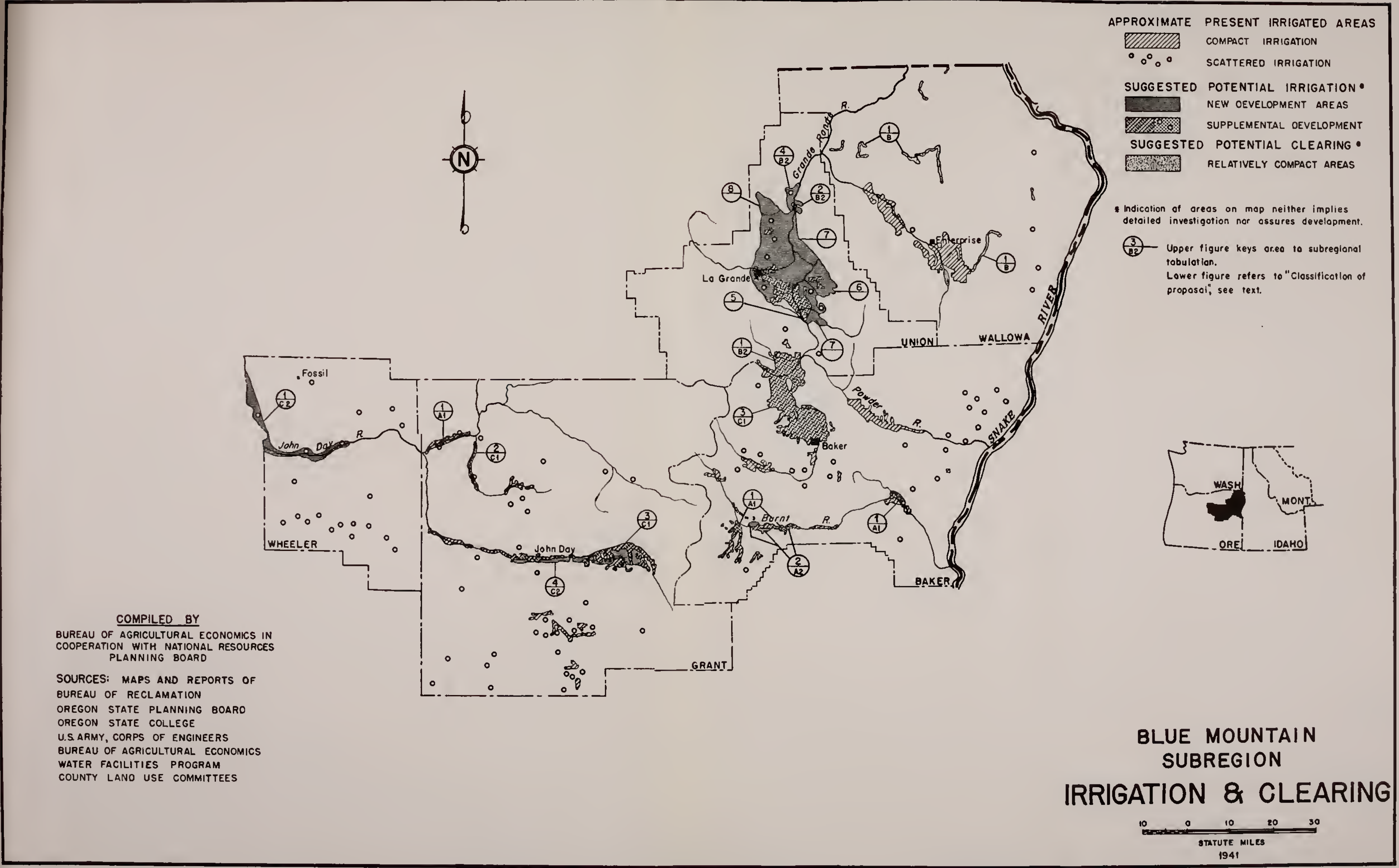
APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL CLEARING *
RELATIVELY COMPACT AREAS
* Indication of areas on map neither implies detailed investigation nor assures development.
Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
N
Fossil
John Day R.
WHEELER
John Day
GRANT
La Grande
Grande Ronde R.
Enterprise
UNION
WALLOWA
Powder R.
Baker
Burnt R.
BAKER
SNAKE RIVER
WASH
MONT
ORE
IDAHO
10 0 10 20 30
STATUTE MILES
1941

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OREGON STATE COLLEGE
U.S. ARMY, CORPS OF ENGINEERS
BUREAU OF AGRICULTURAL ECONOMICS
WATER FACILITIES PROGRAM
COUNTY LAND USE COMMITTEES

BLUE MOUNTAIN
SUBREGION
IRRIGATION & CLEARING

FIGURE 22

rialize will depend greatly on the outcome of current investigations in Union County.

Much of the land contained in the proposed project areas is now in large private ownerships, making new farms contingent upon subdivision of present holdings.

Probable Types of Farming and Sizes of Farms

Predominating among the several recommended types of farming, especially in Baker, Grant, Wallowa, and Wheeler Counties, is range livestock. In Union County, particularly in regard to the Grande Ronde project, general and dairy farming are advocated to some extent. Unfavorable marketing conditions are somewhat responsible for many of the livestock recommendations. Tree fruits are more prevalent in the Cove-Minam area [46] than elsewhere in the subregion, and recommendations favor the continued production of fruit in that locality.

Recommendations as to size of farm quite uniformly advocate 100 to 125 acres of cropland. In addition to cropland, range livestock enterprises require enough range land to carry the stock through the normal grazing season. Specific estimates as to the needed amounts of such range land are lacking, but it can be assumed that the average will be well over 1,000. If 100 range cattle can be considered sufficient for a family-sized livestock unit, and if 30 acres of range will carry an animal through the grazing season, the range land requirement per farm would be 3,000 acres. It is significant, however, that the range lands throughout most of this subregion have already been overstocked, and it seems improbable that they can permanently support any more animals than now use them during the grazing season. Wide differences of opinion will arise concerning these assumptions; nevertheless they serve to illustrate the difficulties that will be encountered.

Improved irrigation will not materially alter the range situation except as it may provide feed for somewhat longer feeding seasons and otherwise stabilize the livestock enterprises.

Classification of Proposals

The full significance of development potentialities in this subregion cannot be derived from table 14 since classification of the major proposal, comprising nearly half of the total acres involved, has been held in abeyance pending completion of the Bureau of Reclamation's current investigations. Earlier investigational work [47] recognized that storage facilities were imperative for stabilization of stream flow and provision of adequate irrigation water during the growing season but revealed that considerable difficulty might be experienced in locating a suitable dam site. A further complication in the Grande Ronde area is the potential drainage problem throughout the valley floor.

TABLE 14.—*Blue Mountain subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	213,050	122,500	90,550	1,038
Class A	19,800	17,500	2,300	23
Class B	26,250	20,000	6,250	130
Class C	67,000	65,000	2,000	85
Unclassified	100,000	20,000	80,000	800
IRRIGATION				
Total irrigation	204,050	113,500	90,550	1,038
Class A1	17,800	16,300	1,500	15
Class A2	2,000	1,200	800	8
Class B2	17,250 [4] (9,000)	11,000 (9,000)	6,250	130
Class C1	60,000	60,000		50
Class C2	7,000	5,000	2,000	35
Unclassified [5]	100,000	20,000	80,000	800
DRAINAGE				
Unclassified	(40,000)	(10,000)	(30,000)	
CLEARING				
Total clearing	9,000	9,000		
Class B	9,000	9,000		

[1] For detailed tabulation of projects see appendix, table 7.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.
[5] This area is now under investigation by the Bureau of Reclamation.

Coupled with these factors, which will probably operate to increase development costs, is the fact that the type of farming recommended borders on the extensive and cannot be expected to carry as high annual costs per acre as could more intensive types. Until the report is issued, however, no conclusions should be drawn.

Of the proposals which have been classified, it will be noted that a major portion of the acreage falls into class C.

In view of these conditions, it would appear that relatively few favorable development potentialities exist except as they may be revealed by current investigations of the Grande Ronde project.

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[46] Located in Union County.

[47] A progress report on the Grande Ronde investigations was made by the Bureau of Reclamation in October 1935.

realize will depend greatly on the outcome of current investigations in Union County.

Much of the land contained in the proposed project areas is now in large private ownerships, making new farms contingent upon subdivision of present holdings.

Probable Types of Farming and Sizes of Farms

Predominating among the several recommended types of farming, especially in Baker, Grant, Wallowa, and Wheeler Counties, is range livestock. In Union County, particularly in regard to the Grande Ronde project, general and dairy farming are advocated to some extent. Unfavorable marketing conditions are somewhat responsible for many of the livestock recommendations. Tree fruits are more prevalent in the Cove-Minam area[46] than elsewhere in the subregion, and recommendations favor the continued production of fruit in that locality.

Recommendations as to size of farm quite uniformly advocate 100 to 125 acres of cropland. In addition to cropland, range livestock enterprises require enough range land to carry the stock through the normal grazing season. Specific estimates as to the needed amounts of such range land are lacking, but it can be assumed that the average will be well over 1,000. If 100 range cattle can be considered sufficient for a family-sized livestock unit, and if 30 acres of range will carry an animal through the grazing season, the range land requirement per farm would be 3,000 acres. It is significant, however, that the range lands throughout most of this subregion have already been overstocked, and it seems improbable that they can permanently support any more animals than now use them during the grazing season. Wide differences of opinion will arise concerning these assumptions; nevertheless they serve to illustrate the difficulties that will be encountered.

Improved irrigation will not materially alter the range situation except as it may provide feed for somewhat longer feeding seasons and otherwise stabilize the livestock enterprises.

TABLE 14.—*Blue Mountain subregion—Summary of proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals[3]	213,050	122,500	90,550	1,038
Class A	19,800	17,500	2,300	23
Class B	26,250	20,000	6,250	130
Class C	67,000	65,000	2,000	85
Unclassified	100,000	20,000	80,000	800
IRRIGATION				
Total irrigation	204,050	113,500	90,550	1,038
Class A1	17,800	16,300	1,500	15
Class A2	2,000	1,200	800	8
Class B2	17,250 [4] (9,000)	11,000 (9,000)	6,250	130
Class C1	60,000	60,000		50
Class C2	7,000	5,000	2,000	35
Unclassified[5]	100,000	20,000	80,000	800
DRAINAGE				
Unclassified	(40,000)	(10,000)	(30,000)	
CLEARING				
Total clearing	9,000	9,000		
Class B	9,000	9,000		

[1] For detailed tabulation of projects see appendix, table 7.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.
[5] This area is now under investigation by the Bureau of Reclamation.

Classification of Proposals

The full significance of development potentialities in this subregion cannot be derived from table 14 since classification of the major proposal, comprising nearly half of the total acres involved, has been held in abeyance pending completion of the Bureau of Reclamation's current investigations. Earlier investigational work[47] recognized that storage facilities were imperative for stabilization of stream flow and provision of adequate irrigation water during the growing season but revealed that considerable difficulty might be experienced in locating a suitable dam site. A further complication in the Grande Ronde area is the potential drainage problem throughout the valley floor.

Coupled with these factors, which will probably operate to increase development costs, is the fact that the type of farming recommended borders on the extensive and cannot be expected to carry as high annual costs per acre as could more intensive types. Until the report is issued, however, no conclusions should be drawn.

Of the proposals which have been classified, it will be noted that a major portion of the acreage falls into class C.

In view of these conditions, it would appear that relatively few favorable development potentialities exist except as they may be revealed by current investigations of the Grande Ronde project.

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[46] Located in Union County.

[47] A progress report on the Grande Ronde investigations was made by the Bureau of Reclamation in October 1935.

MIDDLE COLUMBIA-PALOUSE SUBREGION

Acreage in Development Proposals

Opportunities for land development in the Middle Columbia-Palouse subregion[48] are confined to irrigation; and although 203,922 acres are included in suggested proposals, it is significant that about 66 percent of these can be considered only as remote possibilities and therefore have been placed in deferred categories.

Irrigation cannot be considered as basic to prevailing farm enterprises, which revolve largely around dry-land wheat, with field peas having become important in recent years; but because of soil and climatic characteristics, it certainly is a fundamental requirement for diversification and intensification of operation. Some exception to this may be noted in the eastern end of the subregion. Annual rainfall ranges from a minimum of about 8 inches in the dryer areas along the Columbia River to over 20 inches in the Palouse wheat area in Washington. Seasonal temperatures are characterized by rather warm summers and moderately cold winters with occasional extremes of heat over 100° F. and cold considerably below zero.

It will be noted that some proposed land clearing, 15,000 acres, and a little drainage, 8,000 acres, are listed in table 15 but only as of secondary importance to irrigation.

This is one of the few subregions where the purpose of development is more predominantly to provide new farming opportunities than to benefit existing farms. Considering acreages of all suggested proposals there is nearly a 5 to 1 ratio in favor of new farms. Eliminating the class C proposals, the balance is still in favor of new farms but the ratio is less than 2 to 1. This indicates that the proposals to benefit present farms are more sound, generally, than those which would develop new lands for new settlement.

New Farm Possibilities

Additional farms that conceivably might result from all proposals are estimated to approach 1,000. Only 60 of these are under class A proposals, and only 247 in class B, while 640 are in class C categories. Twenty farms are in connection with an unclassified project.

Perhaps the best opportunity for additional farms has no connection with land development but depends, rather, on subdivision of present large wheat farms. For example, it has been estimated that in Whitman County alone, 1,000 more family-sized farms could be provided in this manner. Inasmuch as such potentialities are not a resultant of land development as considered herein, they are outside the scope of this report and, therefore, have not been tabulated.

Probable Types of Farming and Sizes of Farms

A discussion of types of farming can hardly be introduced without mentioning wheat. This subregion[49] comprises one of the greatest wheat areas in the Nation. In addition to their large acreages devoted to wheat and their relatively high yields per acre, these wheat farms are characterized by remarkable stability. But insofar as wheat is a dry-land enterprise, it does not enter into the recommendations for irrigable areas except as a dry-land supplement.

Under irrigation, the type of farming necessarily must shift toward a more intensive land use. The extent of shift is decidedly limited[50] by both physical and economic factors, and consequently, the recommended types of farms center largely around forage crop production. Within these limitations, range livestock and dairying are the chief suggestions, with some general and specialty crops added in localized areas.

Soils of the area at the lower elevations are usually

TABLE 15.—*Middle Columbia-Palouse subregion—Summary of proposals for agricultural land development*[1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	203,922	36,072	167,850	967
Class A	4,572	1,572	3,000	60
Class B	61,350	25,100	36,250	247
Class C	134,000	7,400	126,600	640
Unclassified	4,000	2,000	2,000	20
IRRIGATION				
Total irrigation	203,922	36,072	167,850	967
Class A1	4,572	1,572	3,000	60
Class B1	19,600		19,600	100
Class B2	41,750	25,100	16,650	147
Class C1	84,000	5,000	79,000	310
Class C2	31,000	2,400	28,600	230
Class C3	19,000		19,000	100
Unclassified	4,000	2,000	2,000	20
DRAINAGE				
Total drainage				
Class B2	[4] (8,000)	(3,000)	(5,000)	
CLEARING				
Total clearing				
Class B	(15,000)		(15,000)	

[1] For detailed tabulation of projects see appendix, table 8.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

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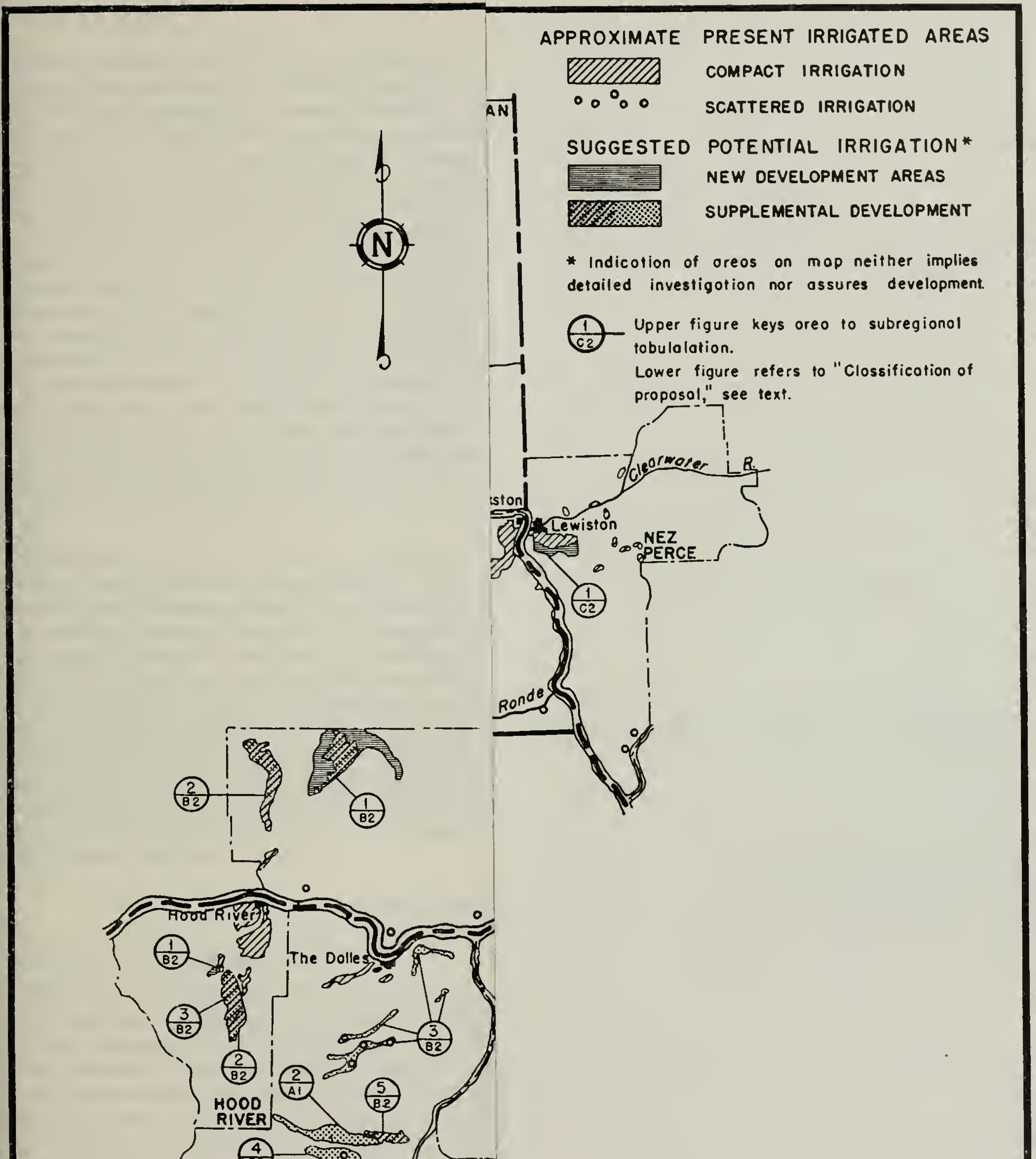
[48] This subregion is composed of Klickitat, Walla Walla, Columbia, Garfield, Asotin, and Whitman Counties in Washington; Hood River, Wasco, Sherman, Gilliam, Morrow, and Umatilla Counties in Oregon; and Nez Perce County in Idaho.

[49] Hood River County is not typical of the balance of the subregion and should be excepted from this discussion.

[50] *Ibid.*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* Indication of areas on map neither implies detailed investigation nor assures development.

MIDDLE COLUMBIA-PALOUSE SUBREGION

IRRIGATION

1941

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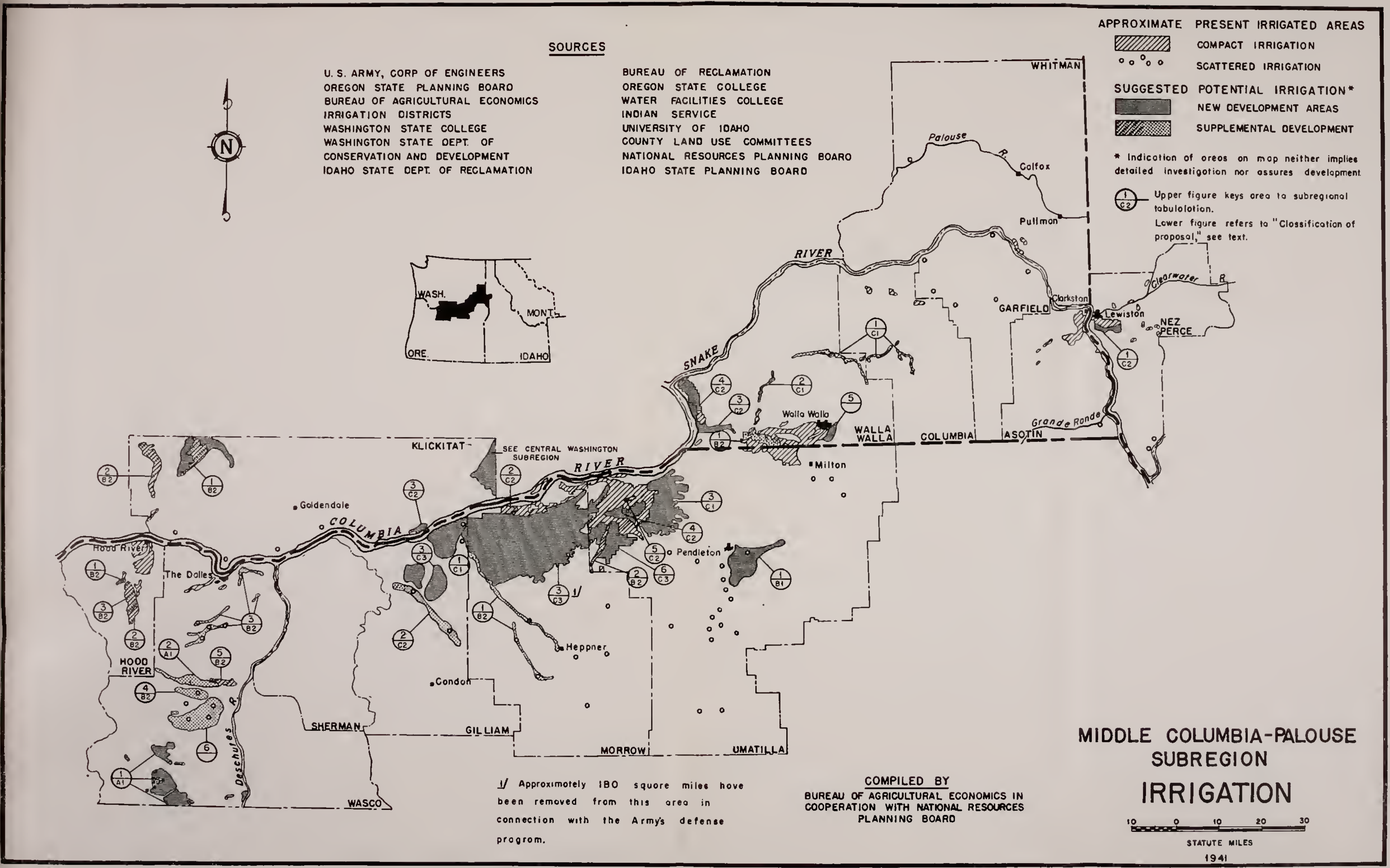

SOURCES

U. S. ARMY, CORP OF ENGINEERS
OREGON STATE PLANNING BOARD
BUREAU OF AGRICULTURAL ECONOMICS
IRRIGATION DISTRICTS
WASHINGTON STATE COLLEGE
WASHINGTON STATE DEPT. OF CONSERVATION AND DEVELOPMENT
IDAHO STATE DEPT. OF RECLAMATION
BUREAU OF RECLAMATION
OREGON STATE COLLEGE
WATER FACILITIES COLLEGE
INDIAN SERVICE
UNIVERSITY OF IDAHO
COUNTY LAND USE COMMITTEES
NATIONAL RESOURCES PLANNING BOARD
IDAHO STATE PLANNING BOARD

APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION
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SUGGESTED POTENTIAL IRRIGATION*

▩ NEW DEVELOPMENT AREAS
▨ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

1/C2 Upper figure keys area to subregional tabulolation.
Lower figure refers to "Classification of proposal," see text.

1/ Approximately 180 square miles have been removed from this area in connection with the Army's defense program.

COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD

MIDDLE COLUMBIA-PALOUSE SUBREGION
IRRIGATION

1941

FIGURE 23

of sandy to sandy loam texture and become finer textured at higher elevations. The lighter soils have not been irrigated successfully because of their low productivity and high water requirement—sometimes amounting to 10 or 12 acre-feet annually. Where soil and water would permit the production of truck crops, the marketing disadvantage becomes a limiting factor.

Hood River County deserves special treatment inasmuch as it is unique in this subregion and would more properly constitute a subregion in itself. Farming in this county is quite largely dependent on irrigation, and the strong emphasis as to type, both existing and recommended, is diversified fruit, including a variety of tree fruits and berries. Orchard soils, generally, which are of silt loam or fine sandy loam texture, are quite well suited to irrigation and have good drainage.

In Hood River County, the most desirable size for a family-sized diversified fruit farm is about 40 acres, though one recommendation is shown to be only 20 acres.

Opinion is divided concerning suitable sizes of irrigated or partly irrigated farms elsewhere. It is evident that at least several hundred acres are desirable. For the range livestock enterprise it is suggested that a unit should contain 60 to 100 acres of irrigated cropland, and it is commonly believed that from 100 to 700 acres of dry-land wheat should be operated in conjunction with the irrigated cropland. When dairying and general farming enter the picture, the recommended acreage of irrigated cropland shifts, depending on the physical adaptabilities of the particular area; but the suggestion that wheat farming be retained as a supplementary enterprise still persists.

It is difficult to obtain from experience much evidence of proper size of irrigated farms since the preponderance of experience, especially in irrigation districts, has been unfavorable. This observation excepts Hood River County and limited localities elsewhere.

Classification of Proposals

As stated before, dry-land wheat farming in this area has a history of remarkable stability, while the history of irrigation in wheat areas is quite the contrary. This has caused many people to question the desirability of upsetting a stable wheat economy with irrigation of doubtful feasibility.

Limitations of the project areas as reflected in these doubts largely account for 66 percent of all acres in proposals being classified in the deferred group. Of the 134,000 acres in class C, 78,000, or about 60 percent, involve tremendous pumping lifts from the Columbia River to irrigate light sandy soils, the like of which are currently receiving 6 to 12 acre-feet of water annually. Even with this supply, many farm areas have failed to meet high enough annual assessments to repay indebtedness and carry annual operating and maintenance costs.

Development of these areas will come only at a time when there is extreme pressure for greater agricultural production. Even then, development would probably be contingent upon prior construction of the proposed dams on the Columbia River.

The class B proposals invariably involve heavier soils, either loess or alluvial, and anticipate more reasonable annual costs for operation, maintenance, and retirement of debt.

CENTRAL WASHINGTON SUBREGION

Acreage in Development Proposals

Prospective land development in central Washington[51] totals nearly 1,589.000 acres[52] and is characterized by large irrigation projects. Overshadowing all is the huge Columbia Basin Reclamation project,[53] which alone comprises more than 1.200,000 acres. Land clearing will be involved to a very limited extent, and drainage facilities will become necessary in certain localities in connection with and as a consequence of irrigation.

In contrast to most other subregions, virtually all of the lands to be developed would provide for new farms.

Except for dry-land grains and native grasses, agriculture in central Washington is wholly dependent upon irrigation. Annual rainfall in the vast area of the Columbia Basin project averages only 8.2 inches, and less than half of this falls during the growing season.[54] As compared with coastal areas, winters are cold, and summers are hot. Precipitation in development areas elsewhere in the subregion will exceed that in the Columbia Basin slightly but will seldom be more than 10 inches. Soils and climate are suited to temperate zone crops.

New Farm Possibilities

Not only are the new farm potentialities greater in this area than anywhere else in the Northwest, but of

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[51] The central Washington subregion includes the Yakima, Columbia Basin, and Okanogan areas; and includes Benton, Franklin, Adams, Grant, Yakima, Kittitas, Chelan, Douglas, and Okanogan Counties.

[52] Although 209,000 acres are classified into deferred categories, the percentage given this rating is only 13 percent.

[53] Details concerning all phases of this project can be obtained through the office of the Bureau of Reclamation at Ephrata, Wash.

[54] *Washington, Its People, Products, and Resources*, Belle Reeves, Secretary of State, Olympia, Wash. 1910.

of sandy to sandy loam texture and become finer textured at higher elevations. The lighter soils have not been irrigated successfully because of their low productivity and high water requirement—sometimes amounting to 10 or 12 acre-feet annually. Where soil and water would permit the production of truck crops, the marketing disadvantage becomes a limiting factor.

Hood River County deserves special treatment inasmuch as it is unique in this subregion and would more properly constitute a subregion in itself. Farming in this county is quite largely dependent on irrigation, and the strong emphasis as to type, both existing and recommended, is diversified fruit, including a variety of tree fruits and berries. Orchard soils, generally, which are of silt loam or fine sandy loam texture, are quite well suited to irrigation and have good drainage.

In Hood River County, the most desirable size for a family-sized diversified fruit farm is about 40 acres, though one recommendation is shown to be only 20 acres.

Opinion is divided concerning suitable sizes of irrigated or partly irrigated farms elsewhere. It is evident that at least several hundred acres are desirable. For the range livestock enterprise it is suggested that a unit should contain 60 to 100 acres of irrigated cropland, and it is commonly believed that from 100 to 700 acres of dry-land wheat should be operated in conjunction with the irrigated cropland. When dairying and general farming enter the picture, the recommended acreage of irrigated cropland shifts, depending on the physical adaptabilities of the particular area; but the suggestion that wheat farming be retained as a supplementary enterprise still persists.

It is difficult to obtain from experience much evidence of proper size of irrigated farms since the preponderance of experience, especially in irrigation districts, has been unfavorable. This observation excepts Hood River County and limited localities elsewhere.

Classification of Proposals

As stated before, dry-land wheat farming in this area has a history of remarkable stability, while the history of irrigation in wheat areas is quite the contrary. This has caused many people to question the desirability of upsetting a stable wheat economy with irrigation of doubtful feasibility.

Limitations of the project areas as reflected in these doubts largely account for 66 percent of all acres in proposals being classified in the deferred group. Of the 134,000 acres in class C, 78,000, or about 60 percent, involve tremendous pumping lifts from the Columbia River to irrigate light sandy soils, the like of which are currently receiving 6 to 12 acre-feet of water annually. Even with this supply, many farm areas have failed to meet high enough annual assessments to repay indebtedness and carry annual operating and maintenance costs.

Development of these areas will come only at a time when there is extreme pressure for greater agricultural production. Even then, development would probably be contingent upon prior construction of the proposed dams on the Columbia River.

The class B proposals invariably involve heavier soils, either loess or alluvial, and anticipate more reasonable annual costs for operation, maintenance, and retirement of debt.

CENTRAL WASHINGTON SUBREGION

Acreage in Development Proposals

Prospective land development in central Washington [51] totals nearly 1,589.000 acres [52] and is characterized by large irrigation projects. Overshadowing all is the huge Columbia Basin Reclamation project,[53] which alone comprises more than 1.200,000 acres. Land clearing will be involved to a very limited extent, and drainage facilities will become necessary in certain localities in connection with and as a consequence of irrigation.

In contrast to most other subregions, virtually all of the lands to be developed would provide for new farms. Except for dry-land grains and native grasses, agriculture in central Washington is wholly dependent upon irrigation. Annual rainfall in the vast area of the Columbia Basin project averages only 8.2 inches, and less than half of this falls during the growing season.[54] As compared with coastal areas, winters are cold, and summers are hot. Precipitation in development areas elsewhere in the subregion will exceed that in the Columbia Basin slightly but will seldom be more than 10 inches. Soils and climate are suited to temperate zone crops.

New Farm Possibilities

Not only are the new farm potentialities greater in this area than anywhere else in the Northwest, but of the 19,050 potential farms, 15,950 are in connection with proposals that carry class A1 ratings. Class B proposals account for 1,265 prospective farms and class C proposals for 1,835. Of those in class A1, 15,000 are attributed to the Columbia Basin Reclamation project.[55] Present planning contemplates that actual application of irrigation water to Columbia Basin lands will begin in 1944 at the earliest, with about 50,000 to 70,000 acres coming into use annually thereafter. This will annually provide for 600 to 800 new farms. Expansion will probably proceed over a period of about 25 years. Farming opportunities in other class A1 proposals are partly available now; the remainder are expected to become available during the next several years.

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[51] The central Washington subregion includes the Yakima, Columbia Basin, and Okanogan areas; and includes Benton, Franklin, Adams, Grant, Yakima, Kittitas, Chelan, Douglas, and Okanogan Counties.

[52] Although 209,000 acres are classified into deferred categories, the percentage given this rating is only 13 percent.

[53] Details concerning all phases of this project can be obtained through the office of the Bureau of Reclamation at Ephrata, Wash.

[54] *Washington, Its People, Products, and Resources*, Belle Reeves, Secretary of State, Olympia, Wash. 1940.

Generally speaking, all lands in proposals are in private or corporate ownership and will be available to bona fide settlers at Government appraised dry-land values.

Probable Types of Farming and Sizes of Farms

Prevailing opinion strongly favors the diversified general type of farm. Crops considered well adapted to development areas include: alfalfa, grass, a variety of field crops, small grains, and a variety of fruit and truck crops. Of these, alfalfa will probably constitute about 40 percent of the total irrigable acreage. Alfalfa together with other forage crops and grass pasture will probably account for over 65 percent of the irrigable acreage. Dairy stock, other farm livestock, and poultry are also considered well adapted to the resources of the area.

Because of the magnitude of the areas involved, especially of the Columbia Basin project area, and the influence this project will exert on agricultural production in the Pacific Northwest, it is vitally important that production and marketing be thoroughly investigated and carefully planned. To meet this need, a series of special joint investigations have been set in motion under Bureau of Reclamation sponsorship. One of these is specifically charged with studying types of farm economy best suited to the Columbia Basin irrigation project.[56] Detailed type of farming recommendations will grow out of the findings of this investigation.

TABLE 16.—*Central Washington subregion—Summary of proposals for agricultural land development*[1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	1,588,700	17,000	1,571,700	19,050
Class A	1,276,200	----------	1,276,200	15,950
Class B	102,000	15,500	86,500	1,265
Class C	210,500	1,500	209,000	1,835
IRRIGATION				
Total irrigation	1,588,700	17,000	1,571,700	19,050
Class A1	1,276,200	----------	1,276,200	15,950
Class B1	63,000	8,000	55,000	860
Class B2	39,000	7,500	31,500	405
Class C1	1,500	1,500	----------	----------
Class C2	9,000	----------	9,000	335
Class C3	200,000	----------	200,000	1,500
CLEARING				
Total clearing	----------	----------	----------	----------
Class B	[4] (14,000)	(7,500)	(6,500)	----------

[1] For detailed tabulation of projects see appendix, table 9.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

Opinion at this stage seems strongly in favor of a diversification of operation, with dairying standing out as the most prominent single enterprise.

Although fruit, especially apples, has been one of the leading enterprises in the Yakima Valley area, it has suffered tremendously in the past several years, largely because of marketing difficulties[57] and, therefore, is not recommended for very extensive production in the new areas. Many orchards of long standing have been pulled up, and fruit areas, particularly along the lower Yakima, are in a state of transition from fruit to diversified general farming. On Indian lands, notably the Wapato and Klickitat irrigation units in Yakima County, recommended crops eliminate fruit and are confined principally to alfalfa and potatoes.

Virtually all new farms to accrue from development are in connection with Federal projects which stipulate the maximum size of holding per individual and per family. The prevailing policy in somewhat similar areas is to consider 80 acres adequate for a family-sized farm. Currently, it appears that this practice will be extended to the Columbia Basin project, inasmuch as 80 acres on the average seem to be adequate for a diversified general farm.

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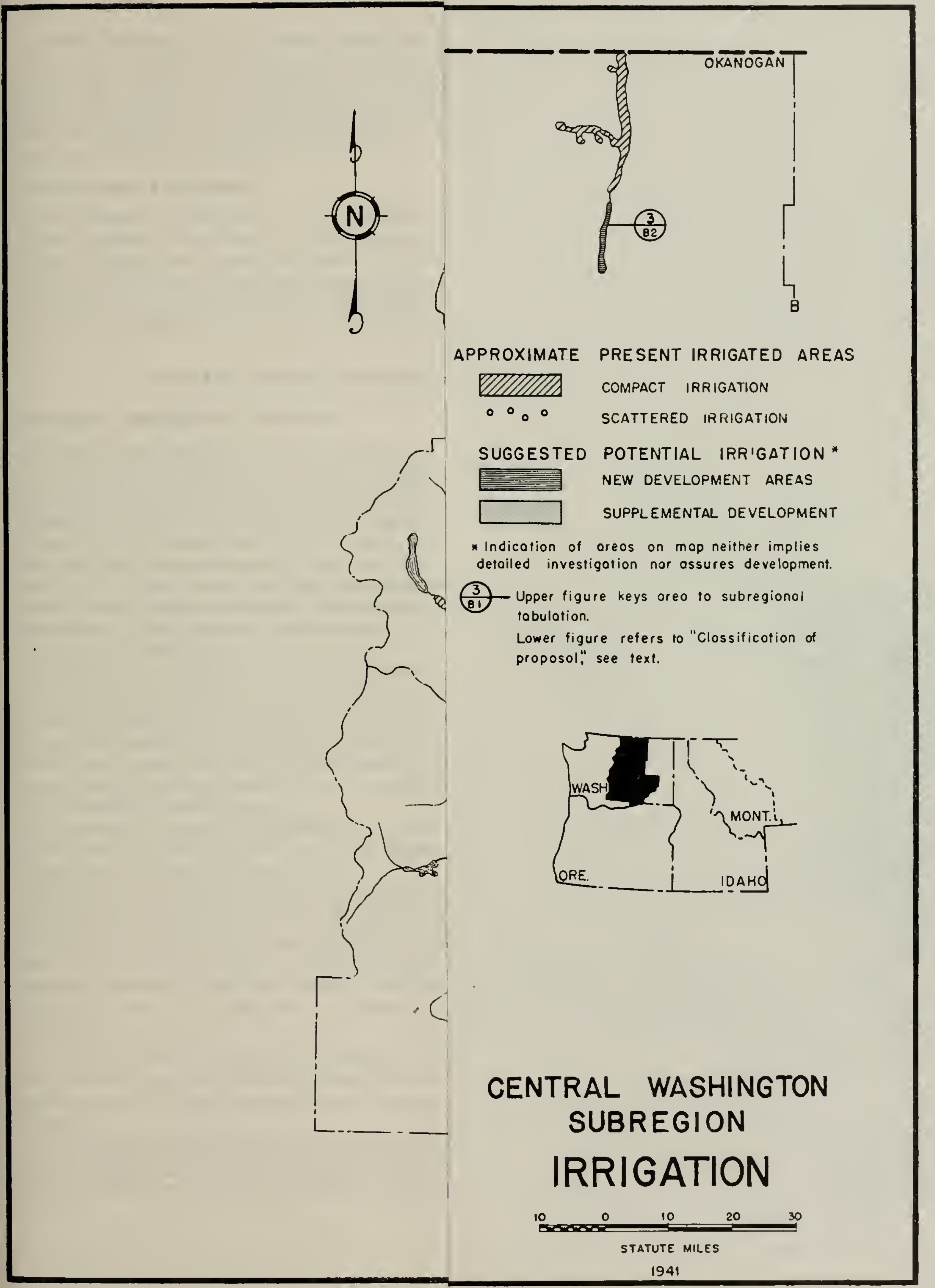
[55] The Columbia Basin Reclamation project is dependent on the Grand Coulee Dam which is nearing completion. This dam will be 550 feet high, 4,300 feet long at the crest, and will create a reservoir 151 miles long. Part of the 1,800,000 kilowatts of power to be developed will be used to pump water into a balancing reservoir from which canals will carry water to the lands to be irrigated.

[56] Part I of the preliminary report of this committee was issued in January 1941 entitled "Suggested Crops, Probable Yields, and Land Utilization of the Columbia Basin Irrigation Project."

[57] In regard to the acute difficulties of the apple industry in the vicinity of Wenatchee, specific problems have been analyzed as follows: Physical—variable land quality, many apple varieties not acceptable on the market, diseases, and operational difficulties; and economic—excessive land values, overcapitalization, impossible debt, lack of truly cooperative marketing facilities, and high operation costs. (Reported by BAE, Division of State and Local Planning.)


OKANOGAN
3
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APPROXIMATE PRESENT IRRIGATED AREAS
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° ° ° ° SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
▤ NEW DEVELOPMENT AREAS
☐ SUPPLEMENTAL DEVELOPMENT
* Indication of areas on map neither implies detailed investigation nor assures development.
3/B1 — Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.
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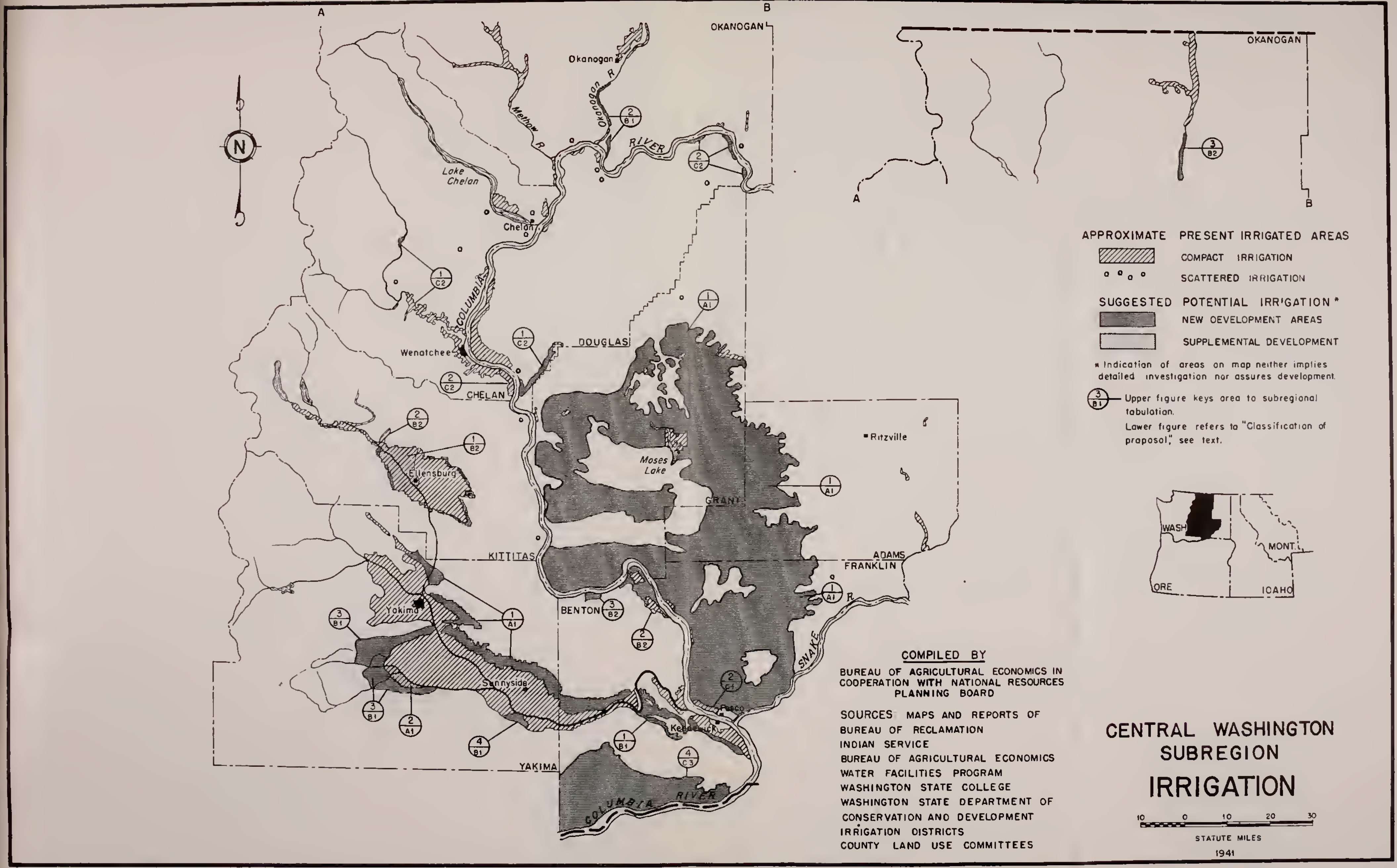
STATUTE MILES

CENTRAL WASHINGTON SUBREGION

IRRIGATION

1941

444553—42 (Face p. 62)


CENTRAL WASHINGTON SUBREGION
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3/B1 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.
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WASHINGTON STATE COLLEGE
WASHINGTON STATE DEPARTMENT OF CONSERVATION AND DEVELOPMENT
IRRIGATION DISTRICTS
COUNTY LAND USE COMMITTEES
10 0 10 20 30
STATUTE MILES
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RIVER
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Wenatchee
DOUGLAS
CHELAN
Ellensburg
Moses Lake
GRANT
Ritzville
ADAMS
FRANKLIN
KITTITAS
BENTON
Yakima
Sunnyside
YAKIMA
SNAKE R
Pasco
Kennewick
COLUMBIA RIVER
WASH
MONT.
ORE
IDAHO
2/B1
2/C2
1/C2
1/A1
2/B2
1/B2
3/B1
2/A1
4/B1
3/B2
1/B1
4/C3
2/C1
3/B2

Figure 24

Notable variations in recommended farm sizes prevail between range livestock operations, which require a large total unit, and specialized fruit or dairy units, which can be smaller. It is significant that none of the areas recommended for smaller, more intensive units is considered feasible under present conditions.

Classification of Proposals

This subregion is distinctive in that 1,276,200 acres, or over 80 percent of all acres in proposals, come under Federal projects now under construction. The first units under the Columbia Basin project are not expected to receive water until at least 1944, while all the new lands under the Wapato pumping project (Indian lands) and part of the new lands under the Roza project will be under ditch in 1941.

Proposals falling under secondary categories are comparatively small private promotions and aggregate a little over 100,000 acres.

Outstanding among the deferred class proposals is the Horse Heaven project, comprising 200,000 acres, which has been virtually abandoned. A district was organized at one time but has now been dissolved. Soils of the Horse Heaven area are fair to good, but the infeasibility of providing irrigation water led to the abandonment of the project. Revival of the proposal and development of the project are likely to come about only as a result of extreme pressure for greater agricultural production.

NORTHEASTERN WASHINGTON-NORTHERN IDAHO SUBREGION

Acreage in Development Proposals

Proposed potentialities for land improvement by means of clearing, irrigation, and drainage, singly or in combination, approach 223,000 acres in this subregion.[58] Inasmuch as this area is characterized by higher rainfall and cooler summers than prevail in most interior areas and by a high percentage of forest and cut-over lands, it is not surprising that land clearing assumes the position of greatest importance among development potentialities, while irrigation though desirable in many areas, drops to second place.

Clearing is the primary need for about 140,450 acres (located mostly in upland areas of northern Idaho where annual precipitation will average 25 to 30 inches), and is of secondary importance to irrigation on an additional 28,600 acres (located principally in northeastern Washington, where the annual precipitation drops off somewhat, averaging 15 to 25 inches).

Improvement by means of irrigation is proposed for 78,120 acres; of which 40,000 are in the Rathdrum Prairie project (Kootenai County, Idaho).

Drainage is quite important among existing developments along the bottom lands of the Kootenai, Priest, and Clark Fork Rivers, but as a potentiality affects only about 4,250 acres. Perhaps the chief opportunity in relation to drainage is for improvement of facilities in existing districts and subdivision of present large holdings.

Of the total area of proposed development, 114,950 acres, or a little over half, would be primarily to provide new farms, while 107,870 would be chiefly for the benefit of existing farms. About two-thirds of all irrigation is principally for new farms, while only about 44 percent of the clearing is for this purpose. This indicates that holdings in areas proposed for irrigation can be considerably subdivided if irrigated and reflects a need and opportunity for expanding the crop acres of present farms in cut-over areas.

The area to be added to present cropland as a result of development is approximately equal to the acreage of all lands for which clearing is involved, 169,050 acres. Irrigation will not bring much new land into agriculture but will alter and intensify present land use.

New Farm Possibilities

The benefits of proposed land development, in addition to improving many hundreds of existing farms, would provide for approximately 1,313 new ones. Of these, 365 are attributed to proposals in class A categories, 873 are class B, and 75 are class C. This indicates that a majority of development and settlement potentialities have limiting factors that weaken their feasibility but which are not sufficiently serious to place the proposals into deferred categories. If a farm adjustment could be made through which farms of a submarginal character could be retired, the net increase in this area might be considerably less than the number of new farms shown, inasmuch as many existing farms in cut-over areas are submarginal in character.

Probable Types of Farming and Sizes of Farms[59]

Limited diversification of operation is highly recommended in this area, with dairying, farm livestock, and

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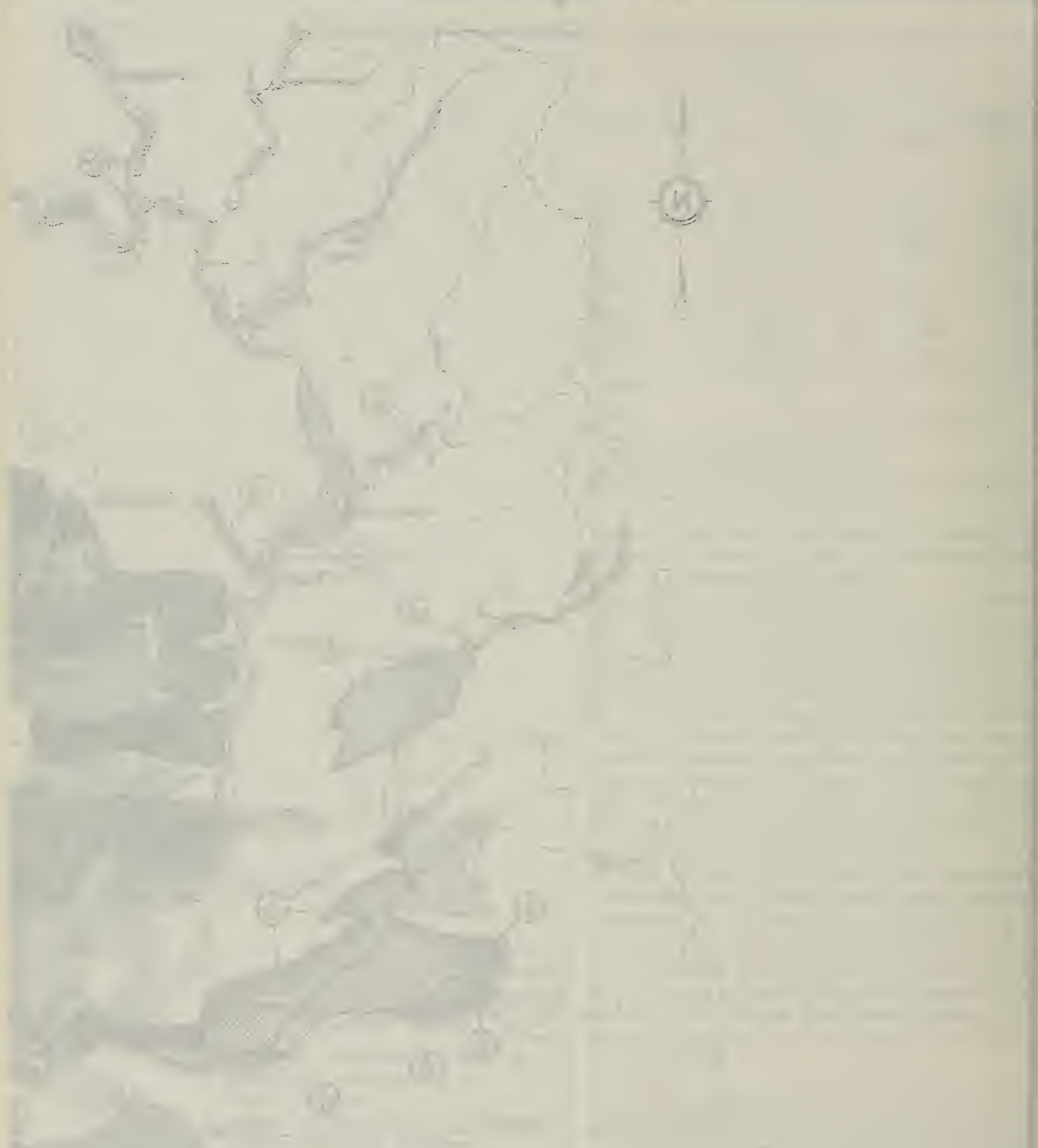
[58] The northeastern Washington-northern Idaho subregion is composed of Ferry, Lincoln, Pend Oreille, Spokane, and Stevens Counties in Washington, and Benewah, Bonner, Boundary, Clearwater, Kootenai, Latah, Lewis, and Shoshone Counties and a part of Idaho County in Idaho.

[59] Substantiation for much of the information in this section is provided by Donald T. Griffith's report *Land Utilization and Settlement Opportunities in Kootenai County, Idaho*, Bureau of Agricultural Economics; June 1942.



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NORTHEASTERN WASHINGTON-NORTHERN IDAHO SUBREGION

Acreage in Development Proposals

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New Farm Possibilities

The benefits of proposed land development, in addition to improving many hundreds of existing farms, would provide for approximately 1,313 new ones. Of these, 365 are attributed to proposals in class A categories, 873 are class B, and 75 are class C. This indicates that a majority of development and settlement potentialities have limiting factors that weaken their feasibility but which are not sufficiently serious to place the proposals into deferred categories. If a farm adjustment could be made through which farms of a submarginal character could be retired, the net increase in this area might be considerably less than the number of new farms shown, inasmuch as many existing farms in cut-over areas are submarginal in character.

Probable Types of Farming and Sizes of Farms[59]

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[58] The northeastern Washington-northern Idaho subregion is composed of Ferry, Lincoln, Pend Oreille, Spokane, and Stevens Counties in Washington, and Benewah, Bonner, Boundary, Clearwater, Kootenai, Latah, Lewis, and Shoshone Counties and a part of Idaho County in Idaho.

[59] Substantiation for much of the information in this section is provided by Donald T. Griffith's report *Land Utilization and Settlement Opportunities in Kootenai County, Idaho*, Bureau of Agricultural Economics; June 1942.

TABLE 17.—*Northeastern Washington-Northern Idaho subregion—Summary of proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals[3]	222,820	107,870	114,950	1,313
Class A	98,000	64,000	34,000	365
Class B	113,870	39,120	74,750	873
Class C	9,700	3,500	6,200	75
Unclassified	1,250	1,250		
CLEARING				
Total clearing	140,450	79,100	61,350	594
Class A	96,000	62,000	34,000	365
	[4] (2,000)	(2,000)		
Class B	37,450	16,100	21,350	154
	(26,600)	(10,700)	(15,900)	
Class C	7,000	1,000	6,000	75
IRRIGATION				
Total irrigation	78,120	26,020	52,100	701
Class A2	2,000	2,000		
	(1,000)	(1,000)		
Class B1	40,000	6,000	34,000	400
Class B2	34,920	17,020	17,900	301
Class C1	200		200	
Class C2	1,000	1,000		
DRAINAGE				
Total drainage	4,250	2,750	1,500	18
Class B2	1,500		1,500	18
Class C3	1,500	1,500		
Unclassified	1,250	1,250		

[1] For detailed tabulation of projects see appendix, table 10.
[2] For definition of various classes see p. 38.
[3] These exclude overlap as described in footnote 4 below.
[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type but are not included in totals.

cash crops comprising the principal enterprises. In the diversified farm, half or more of the farm is often devoted to alfalfa, clover, or perennial grasses; seldom less than a third is devoted to grains, and the balance is commonly fallow or idle, except for a small acreage of potatoes and garden.

Where dairying has been recommended, a much greater percentage of the farm acreage, probably 80 percent or more should be in alfalfa, clover, and grasses.

Farms emphasizing farm livestock and cash crops should usually devote about 45 percent of their cropland to alfalfa and should have about 40 percent in grains, reserving the balance for fallow, potatoes, and garden.

Sizes of farms recommended range from 50 to 110 acres of cropland, depending on types of farming involved and the adaptability of the soils.

Dairy farms in the higher rainfall areas of northern Idaho often constitute a family-sized unit if they contain 50 to 60 acres of cropland. In northeastern Washington, under a somewhat lower rainfall, the recommended sizes increase to as high as 80 acres of cropland.

In the several areas where dairying and farm livestock are recommended in combination, 60 to 80 acres of cropland are believed necessary.

General farming involves a greater emphasis on cash grains and requires about 110 acres of cropland.

Substantiating these recommendations are those included in a study of Kootenai County[60] as follows:

Type of farming	Recommended acres of class 2 cropland[1]	Principal crops (percent)	
Dairy	50–55	Alfalfa Grain	85 10
General	100–110	Alfalfa Grain	44 40
Cash grain	140–160	Grain Alfalfa	58 42

[1] All soils of Kootenai County have been grouped according to their crop adaptability. Class 2 contains the best opportunities for new settlement.

Diversified farms, obviously, will comprise varying combinations of the recommended types, crops, and acreages.

A desirable complement to farming in this subregion centers around the forest industries. It is very desirable that farm woodlands become an integral part of agricultural operations in timber areas, and possibly the whole agricultural economy in many localities should be directed toward a coordination with forestry in a manner that would provide a permanent supplementary farm income from work off-the-farm in forestry enterprises.

Classification of Proposals

The distribution of acreage by classification finds 44 percent in class A, 51 percent in class B, and only 5 percent in class C.

Land clearing offers the greatest opportunity for land improvement; and although clearing is proposed principally to benefit present farms, it will yield about 594 new ones. A greater proportion of land clearing has been given a primary rating in this area than in subregions west of the Cascade Mountains. This can be attributed largely to differences in costs of clearing and to the fact that the quality of the upland soil in northern Idaho is generally superior to that in western Washington because of less severe leaching. In northern Idaho, average land clearing costs range from $7 to $24 per acre[61] by the bulldozer method. Clearing costs west of the Cascades usually average from $30 to $75 per acre and in the coastal area of the Olympic Peninsula would run much higher, occasionally exceeding $200 per acre. The essential difference in clearing between the two areas is that stumps in northern Idaho and northeastern Washington, as a rule, are smaller, fewer in number, and easier to remove. Furthermore, the costs for machine hire (partly because smaller machines can be

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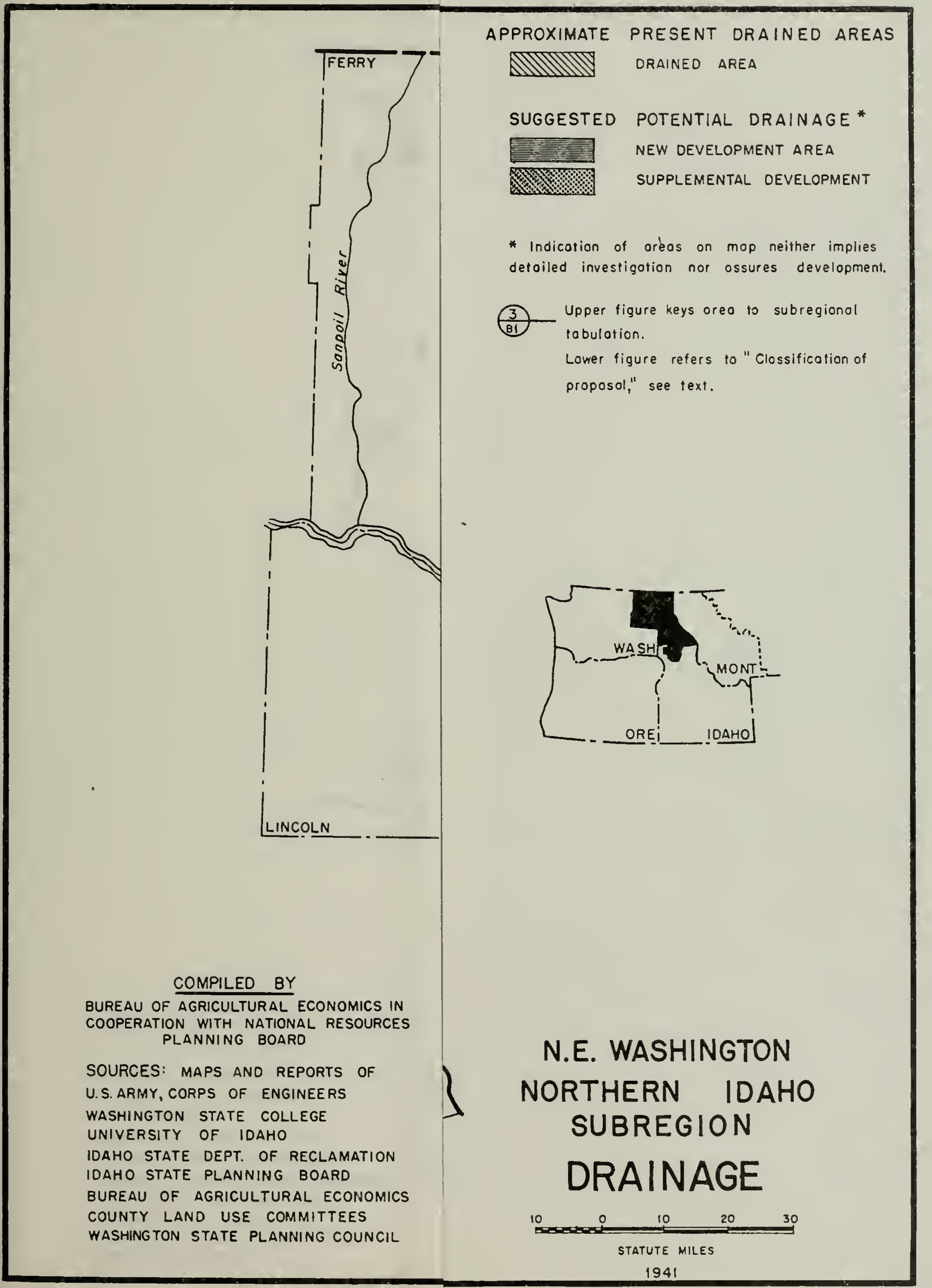
[60] Griffith, *op. cit.*

[61] Figures developed by Donald T. Griffith, BAE, from records provided by county agents and machine operators.



APPROXIMATE PRESENT DRAINED AREAS

▨ DRAINED AREA

SUGGESTED POTENTIAL DRAINAGE *

▤ NEW DEVELOPMENT AREA

▩ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

$\frac{3}{B1}$ Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.

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N.E. WASHINGTON NORTHERN IDAHO SUBREGION

DRAINAGE

1941

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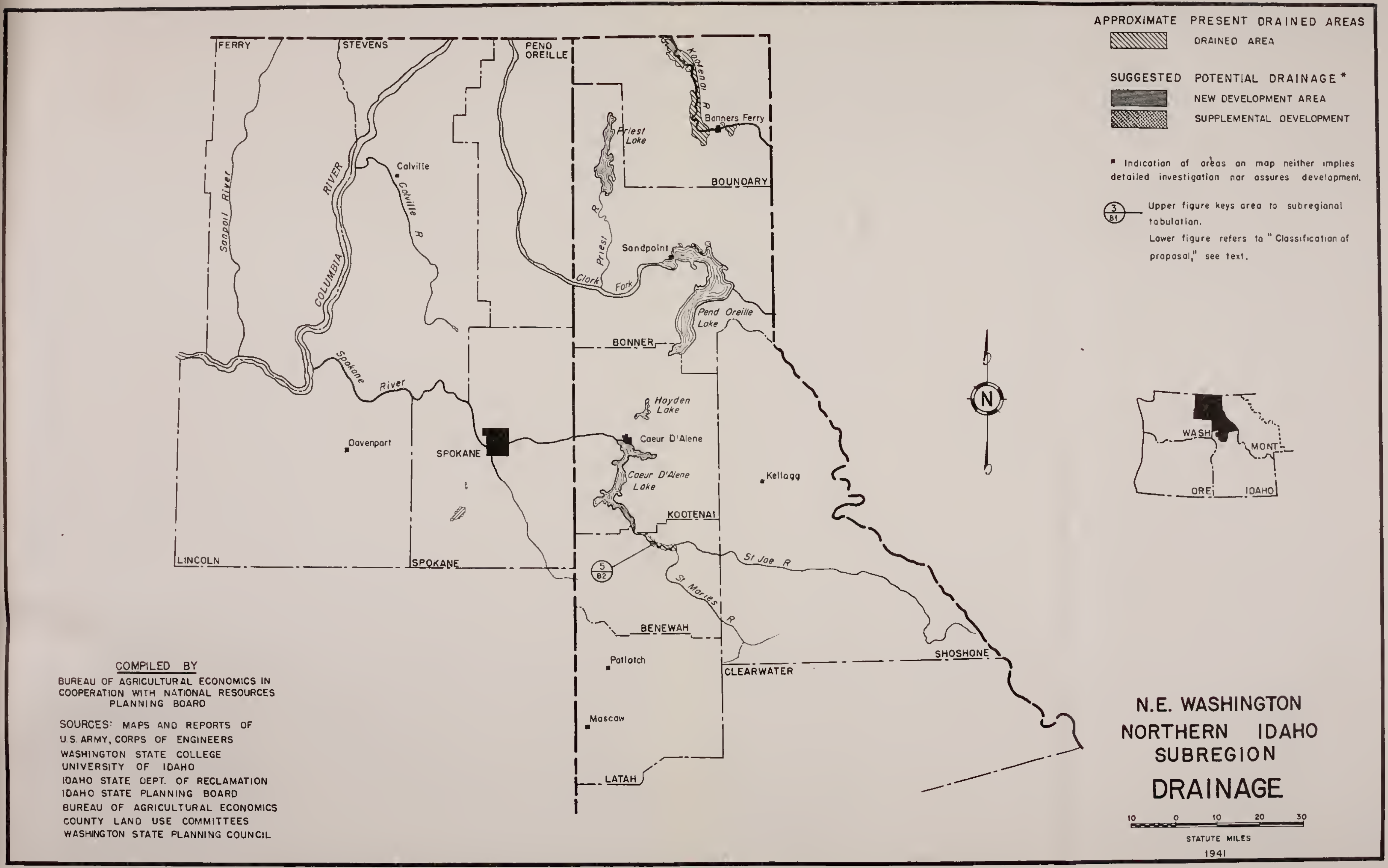
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* Indication of areas on map neither implies detailed investigation nor assures development.
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Lower figure refers to "Classification of proposal," see text.
FERRY
STEVENS
PEND OREILLE
BOUNDARY
BONNER
KOOTENAI
BENEWAH
LATAH
CLEARWATER
SHOSHONE
LINCOLN
SPOKANE
Sanpoil River
COLUMBIA RIVER
Colville R
Colville
Spokane River
Kootenai R
Bonners Ferry
Priest Lake
Priest R
Sandpoint
Clark Fork
Pend Oreille Lake
Hayden Lake
Coeur D'Alene
Coeur D'Alene Lake
Kellogg
Davenport
SPOKANE
St Joe R
St Maries R
5/82
Potlatch
Moscow
N
WASH
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IDAHO
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COUNTY LAND USE COMMITTEES
WASHINGTON STATE PLANNING COUNCIL
N.E. WASHINGTON
NORTHERN IDAHO
SUBREGION
DRAINAGE
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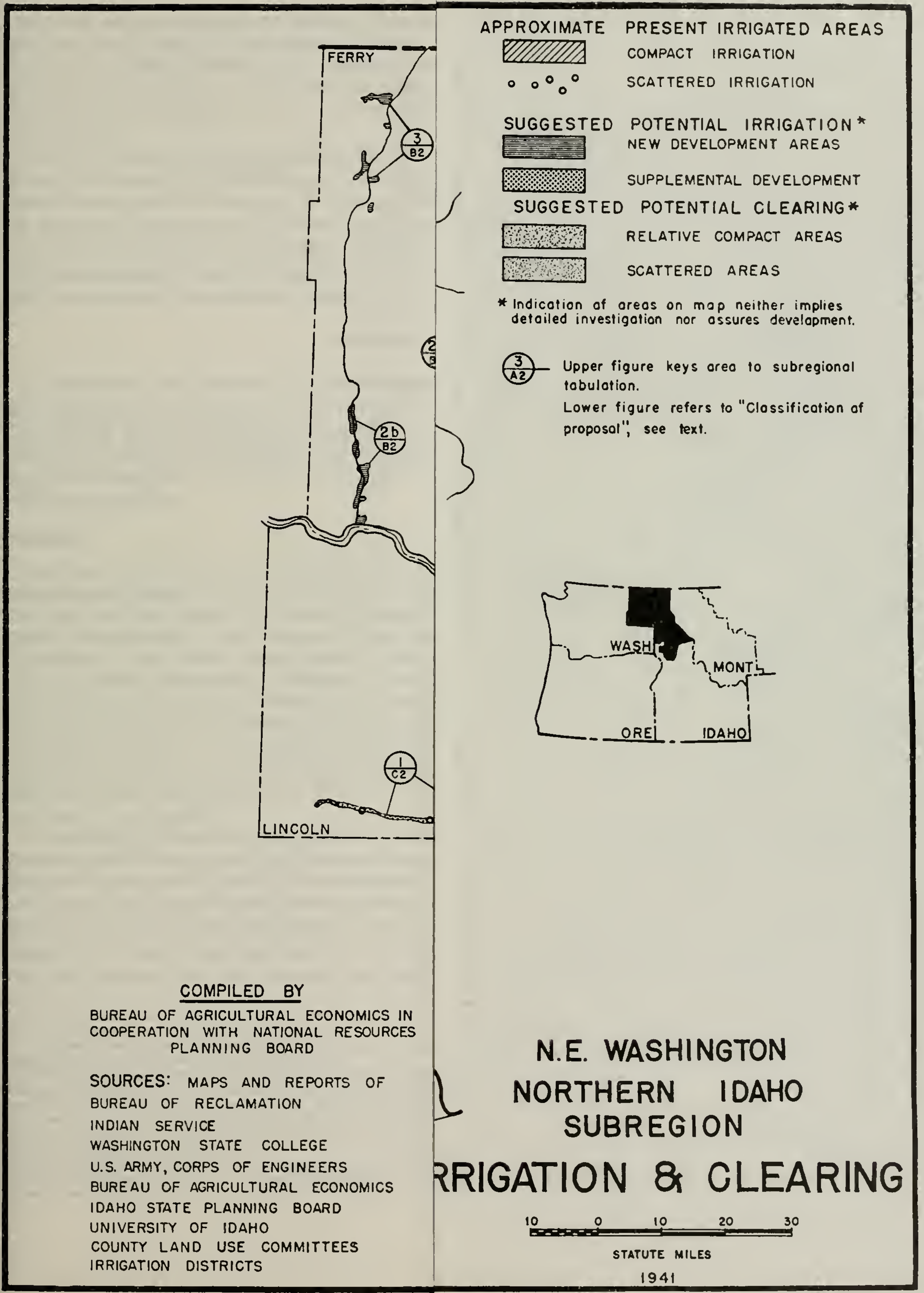
STATUTE MILES
1941

Figure 25


FERRY
LINCOLN
3/B2
2b/B2
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APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL CLEARING*
RELATIVE COMPACT AREAS
SCATTERED AREAS
* Indication of areas on map neither implies detailed investigation nor assures development.
3/A2 Upper figure keys area to subregional tabulation. Lower figure refers to "Classification of proposal", see text.
WASH
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IDAHO
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STATUTE MILES

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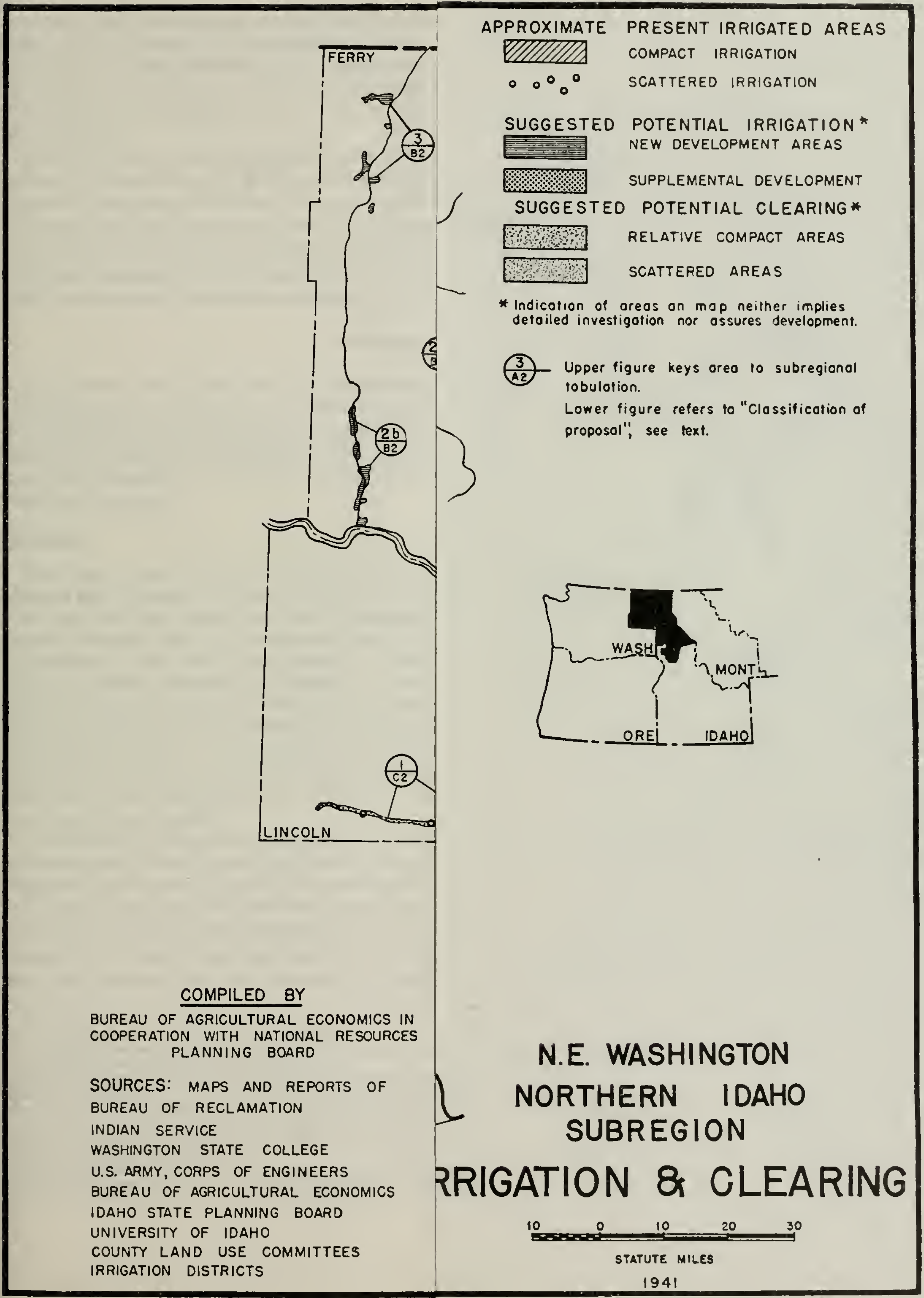
COUNTY LAND USE COMMITTEES
IRRIGATION DISTRICTS

N.E. WASHINGTON
NORTHERN IDAHO
SUBREGION

RRIGATION & CLEARING

1941


APPROXIMATE PRESENT IRRIGATED AREAS
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SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
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SCATTERED AREAS
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3/A2 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
FERRY
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1/C2
LINCOLN
WASH
MONT
ORE
IDAHO
10 0 10 20 30
STATUTE MILES

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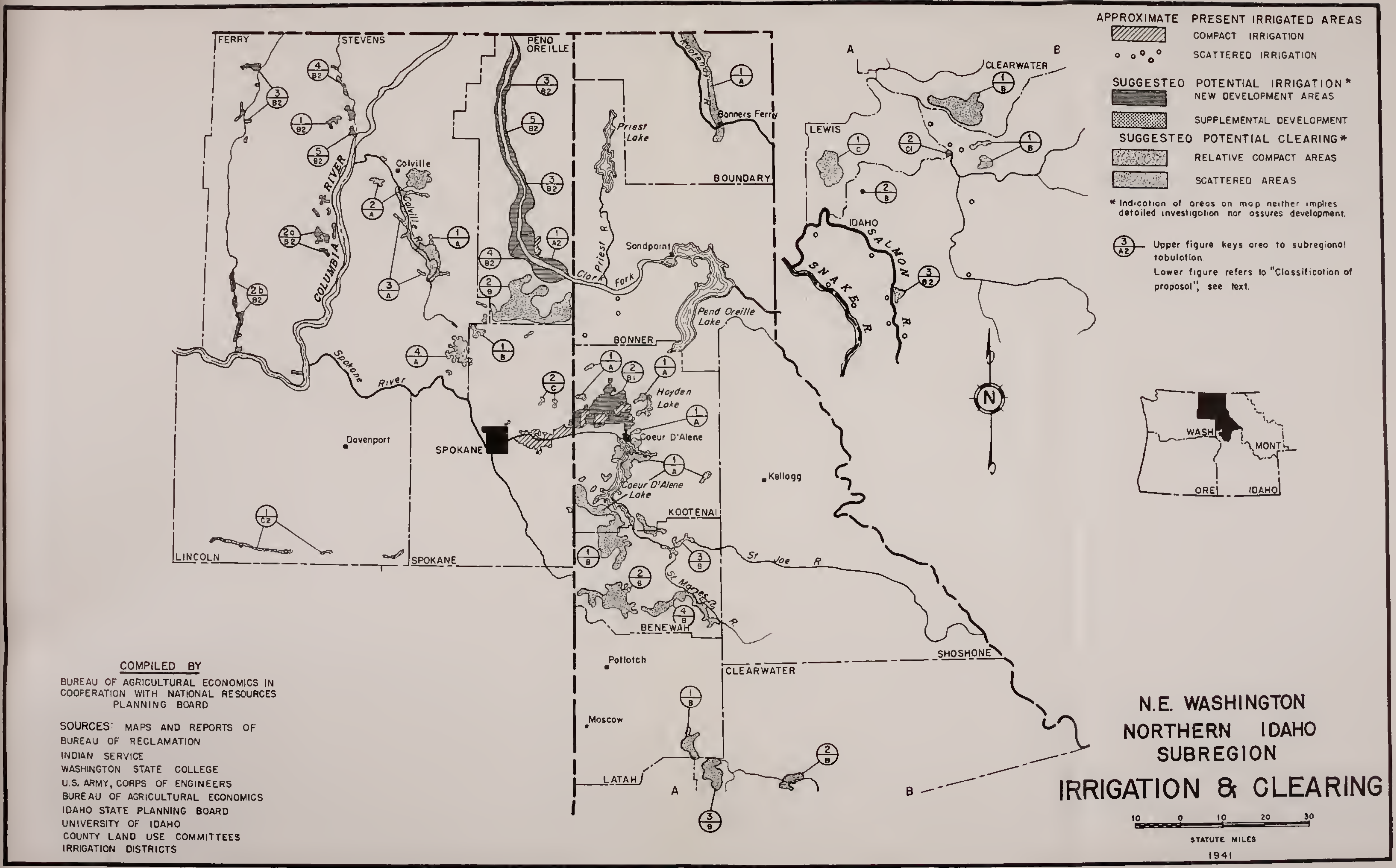
UNIVERSITY OF IDAHO
COUNTY LAND USE COMMITTEES
IRRIGATION DISTRICTS

N.E. WASHINGTON
NORTHERN IDAHO
SUBREGION

RRIGATION & CLEARING

1941


APPROXIMATE PRESENT IRRIGATED AREAS
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SUGGESTED POTENTIAL IRRIGATION*
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL CLEARING*
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LATAH
SHOSHONE
CLEARWATER
LEWIS
IDAHO
Colville
Davenport
SPOKANE
Sandpoint
Bonners Ferry
Coeur D'Alene
Kellogg
Potlatch
Moscow
COLUMBIA RIVER
Colville R
Spokane River
Clark Fork
Priest R
Priest Lake
Pend Oreille Lake
Hayden Lake
Coeur D'Alene Lake
St Joe R
St Maries R
Kootenai R
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COUNTY LAND USE COMMITTEES
IRRIGATION DISTRICTS
N.E. WASHINGTON
NORTHERN IDAHO
SUBREGION
IRRIGATION & CLEARING
10 0 10 20 30
STATUTE MILES
1941

FIGURE 26

used) are lower, as indicated by records that list machine costs including operator at about $4.50 per hour. Machine costs in western Washington and Oregon average nearly twice this amount. This item contributes to the clearing cost differential but by no means fully accounts for it.

Irrigation has been classed predominantly in B categories. It is here that the Rathdrum Prairie project has been placed with a B1 rating. A report in 1939 by the Bureau of Reclamation indicated that irrigation was physically feasible but revealed that economic feasibility was contingent upon the negotiation of a favorable power contract (calculations assumed 0.5 mill per kw. hour), using 22 acre-inches or less of irrigation water annually, and the possibility of constructing satisfactory unlined canals. In regard to these contingencies, it does not at present appear that power can be provided as cheaply as would be required, and experience has shown a need for 3½ to 5 acre-feet of water and a need for lined canals to prevent excessive loss of water.[62]

Other irrigation proposals have not had such thorough investigation but, with one exception, appear to be worthy of further surveys.

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[62] In view of these contingencies, there is some feeling that the Rathdrum Prairie project has been rated generously.

CENTRAL IDAHO SUBREGION

Opportunities for agricultural land development in this mountainous subregion[63] are relatively limited. The limiting factors are the small proportion of land suitable for irrigation, the difficulties of developing adequate water supplies, and the climatic limitation of crops which can be grown.

Acreage

Less than 10 percent of the subregion is in farms, and less than 2 percent is wholly or partially irrigated. The land in farms cannot be greatly increased, but partial irrigations can be improved, and irrigation can be extended to new land. Very roughly, 45,000 acres might be further developed by irrigation. Completed reconnaissance surveys of the Weiser and Payette basin portions of the subregion have established potentialities totaling 12,408 acres. Very rough estimates in the upper Salmon, Pahsimeroi, and Lemhi basins indicate possible development of 32,100 acres. This latter area is now under investigation.[64]

The difficulties of developing adequate water supplies are principally those of providing adequate storage, for irrigation is now mainly supplied by uncontrolled runoff. In the Weiser and Payette basins, suitable storage sites have been tentatively determined.[65] In the upper Salmon River basin, suitable storage sites for irrigation are few[66] because the main streams are deeply entrenched and good dam sites are lacking on the tributary streams. There is, however, a general abundance of water available in the main streams if it could be controlled for irrigation. Nevertheless, even if the limited land that is available could be supplied with irrigation water, the 80- to 100-day growing season and the hazard of frost in any month would limit crop production to hay and small grains. The acreage that can profitably be devoted to these crops is directly proportional to available range.

New Farm Possibilities

There are few possibilities for new farms to develop as most of the areas suitable for irrigation are already in farms. The proposed irrigation development on present farms is expected to increase feed production and thus reduce dependence on range in late fall and early spring. The system of range livestock farming used in the subregion utilizes relatively small irrigated acreages for winter feed bases in combination with the summer range of the nearby national forests. Irrigation improvements, therefore, would benefit existing farms primarily.

TABLE 18.—*Central Idaho subregion—Summary of proposals for agricultural land development*[1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	12,408	12,408	----------	8
Class B	12,408	12,408	----------	8
IRRIGATION				
Total irrigation [3]	12,408	12,408	----------	8
Class B1	12,408	12,408	----------	8

[1] For detailed tabulation of projects see appendix, table 11.
[2] For definition of various classes see p. 38.
[3] An estimated 32,100 acres are under investigation. Their classification at this time is not possible.

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[63] The subregion of central Idaho includes Adams, Boise, Custer, Lemhi, and Valley Counties and a large part of Idaho County.

[64] Because of the nature of information now available this area has been omitted from the summary table of proposals.

[65] Idaho State Planning Board and the University of Idaho, School of Business Administration. *An Economic Survey of the State of Idaho*, Part 1, "The Economy of Southwestern Idaho with Reference to Irrigation Development," Boise, 1940, Table IV, p. 48; also, U. S. Department of Interior, Bureau of Reclamation, *Snake Basin Above Lewiston, Idaho*, Project Investigations, Report No. 43.

[66] U. S. Department of Interior, Geological Survey, *Water Utilization in the Snake River Basin*, by W. G. Hoyt, Water Supply Paper 657, Washington, 1935, p. 155.

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Other irrigation proposals have not had such thorough investigation but, with one exception, appear to be worthy of further surveys.

CENTRAL IDAHO SUBREGION

Opportunities for agricultural land development in this mountainous subregion[63] are relatively limited. The limiting factors are the small proportion of land suitable for irrigation, the difficulties of developing adequate water supplies, and the climatic limitation of crops which can be grown.

Acreage

Less than 10 percent of the subregion is in farms, and less than 2 percent is wholly or partially irrigated. The land in farms cannot be greatly increased, but partial irrigations can be improved, and irrigation can be extended to new land. Very roughly, 45,000 acres might be further developed by irrigation. Completed reconnaissance surveys of the Weiser and Payette basin portions of the subregion have established potentialities totaling 12,408 acres. Very rough estimates in the upper Salmon, Pahsimeroi, and Lemhi basins indicate possible development of 32,100 acres. This latter area is now under investigation.[64]

The difficulties of developing adequate water supplies are principally those of providing adequate storage, for irrigation is now mainly supplied by uncontrolled runoff. In the Weiser and Payette basins, suitable storage sites have been tentatively determined.[65] In the upper Salmon River basin, suitable storage sites for irrigation are few[66] because the main streams are deeply entrenched and good dam sites are lacking on the tributary streams. There is, however, a general abundance of water available in the main streams if it could be controlled for irrigation. Nevertheless, even if the limited land that is available could be supplied with irrigation water, the 80- to 100-day growing season and the hazard of frost in any month would limit crop production to hay and small grains. The acreage that can profitably be devoted to these crops is directly proportional to available range.

New Farm Possibilities

There are few possibilities for new farms to develop as most of the areas suitable for irrigation are already in farms. The proposed irrigation development on present farms is expected to increase feed production and thus reduce dependence on range in late fall and early spring. The system of range livestock farming used in the subregion utilizes relatively small irrigated acreages for winter feed bases in combination with the summer range of the nearby national forests. Irrigation improvements, therefore, would benefit existing farms primarily.

TABLE 18.—*Central Idaho subregion—Summary of proposals for agricultural land development*[1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	12,408	12,408		8
Class B	12,408	12,408		8
IRRIGATION				
Total irrigation [3]	12,408	12,408		8
Class B1	12,408	12,408		8

[1] For detailed tabulation of projects see appendix, table 11.
[2] For definition of various classes see p. 38.
[3] An estimated 32,100 acres are under investigation. Their classification at this time is not possible.

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[62] In view of these contingencies, there is some feeling that the Rathdrum Prairie project has been rated generously.

[63] The subregion of central Idaho includes Adams, Boise, Custer, Lemhi, and Valley Counties and a large part of Idaho County.

[64] Because of the nature of information now available this area has been omitted from the summary table of proposals.

[65] Idaho State Planning Board and the University of Idaho, School of Business Administration. *An Economic Survey of the State of Idaho*, Part 1, "The Economy of Southwestern Idaho with Reference to Irrigation Development," Boise, 1940, Table IV, p. 48; also, U. S. Department of Interior, Bureau of Reclamation, *Snake Basin Above Lewiston, Idaho*, Project Investigations, Report No. 43.

[66] U. S. Department of Interior, Geological Survey, *Water Utilization in the Snake River Basin*, by W. G. Hoyt, Water Supply Paper 657, Washington, 1935, p. 155.

Types of Farming and Sizes of Farms

Range livestock, general farming, and a little fruit farming now prevail in the subregion. New farms that might develop are expected to be similar in type.

Range livestock farms, which predominate in the eastern portion of the subregion, require the use of large acreages; 320 acres is usually held for winter feed production, while a larger acreage of grazing land is leased or rented. In the past, a tendency toward larger-size units has been observed, but irrigation improvements would probably alter the trend by emphasizing intensive use of an irrigated feed base. In the western portion of the subregion general farms and fruit farms are under irrigation, and the proposals for development, while largely to improve present farms, might encourage subdivision of existing units. New units that may develop are expected to consist of 320 acres with 120 acres irrigated.

Classification of Proposals

The Council area of Adams County has been sufficiently investigated to permit classification as a class B1 proposal. The area and location of other potential lands have not been very definitely established. Since current investigations are incomplete and the findings have not been released, the possibilities in the upper Salmon, Pahsimeroi, and Lemhi valleys are not classified in the inventory.

SOUTHWESTERN IDAHO SUBREGION

Acreage in Development Proposals

Proposals for land development in southwestern Idaho[67] embrace over 1,232,000 acres. Since there is little agricultural land in this subregion that receives sufficient rainfall during the growing season successfully to mature a crop, essentially all of the proposals involve irrigation development. The irrigation proposals would benefit either existing farms by supplemental improvements or new farms by full construction. Improvement by drainage is suggested for only 750 acres, all of which would benefit existing farms.

Supplemental developments, primarily to benefit existing farms, involve 369,356 acres, or over one-half of the land now fully or partially irrigated. Some 271,800 acres of highly developed land in the Boise project suffer from a shortage of water in three out of four years. The proposed Anderson Ranch storage reservoir, which would improve the water supply for these lands, is taken into account in the inventory. Much of the remaining acreage that is proposed for supplemental development, however, is not highly developed. The water supplies for these lands are inadequate for so intensive development and, in some cases, are often sufficient for only one or two early season irrigations. The suggested water supply improvements are intended primarily to lengthen the period during which water is available and thus to permit more intensive cultivation. The drainage proposed would alleviate accumulated seepage of irrigation waters on lands now in farms. It, too, would permit more intensive cultivation on present farms.

Irrigation developments, suggested primarily to provide for new farms, involve 863,152 acres. If the suggested proposals were to be constructed, they would increase the present irrigated area about one and one-half times. Development and improvement of a part of the land is already under way. Recently a number of new farms have become available on the Vale-Owyhee project and on the Payette division of the Boise project. In addition to projects under construction, a basin-wide investigation of the Snake River above Lewiston[68] indicates that the use of water for power and irrigation in the Payette and Boise watersheds can be more fully integrated. These explorations show that water could be diverted from the Payette into the Boise watershed and thence extended through exchange to a portion

TABLE 19.—*Southwestern Idaho subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	1, 232, 508	369, 356	863, 152	9, 282
Class A	411, 412	323, 800	87, 612	1, 349
Class B	131, 096	45, 556	85, 540	933
Class C	690, 000	----------	690, 000	7, 000
IRRIGATION				
Total irrigation	1, 231, 758	368, 606	863, 152	9, 282
Class A1	105, 612	52, 000	53, 612	934
Class A2	305, 800	271, 800	34, 000	415
Class B1	62, 946	31, 806	31, 140	303
Class B2	67, 400	13, 000	54, 400	630
Class C1	690, 000	----------	690, 000	7, 000
DRAINAGE				
Total drainage	750	750	----------	----------
Class B1	750	750	----------	----------
Class B2	(1, 500)	(1, 500)	----------	----------

[1] For detailed tabulation of projects see appendix, table 12.
[2] For definition of various classes see p. 38.

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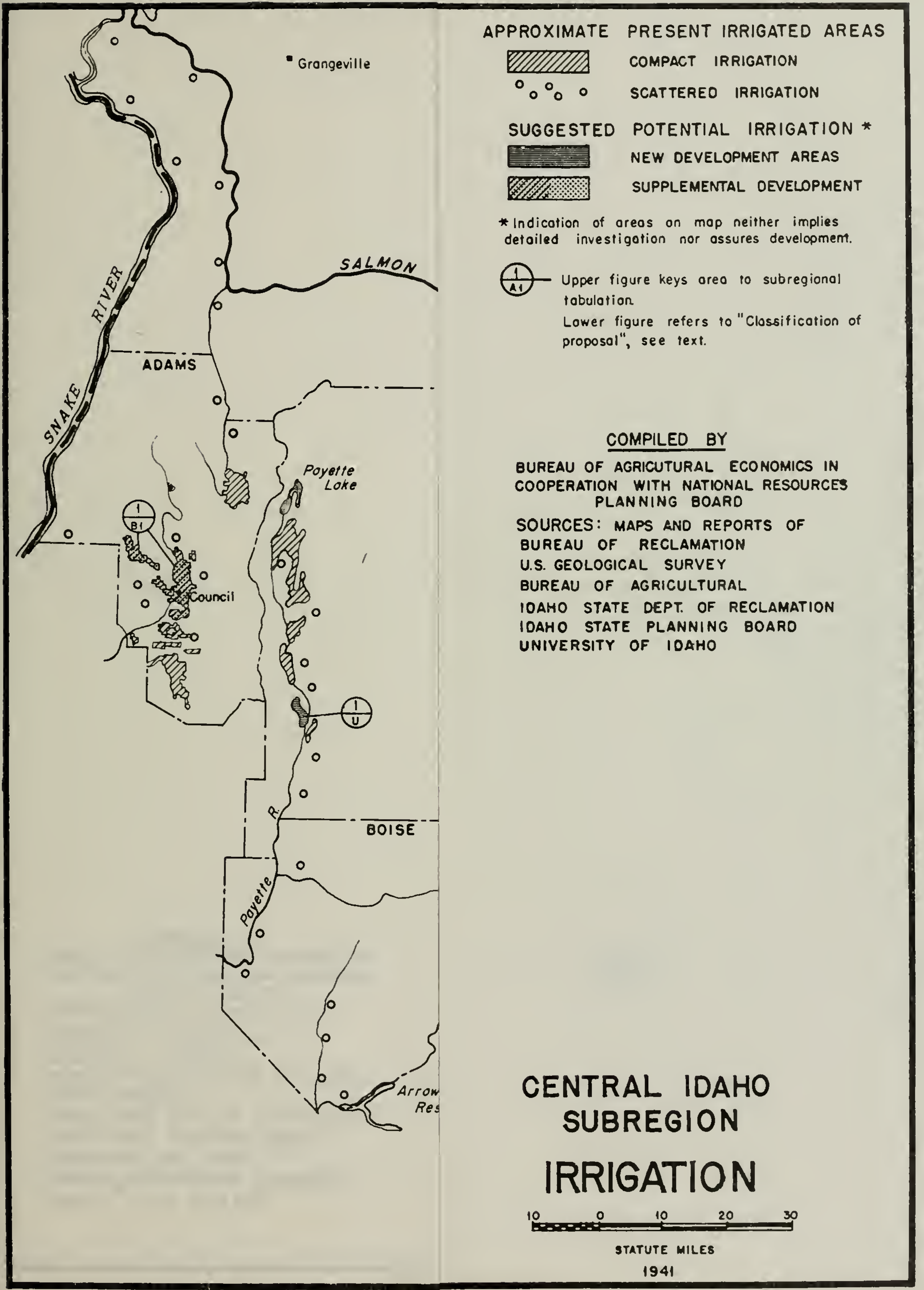
[67] The subregion of southwestern Idaho comprises Ada, Canyon, Elmore, Gem, Owyhee, Payette, and Washington Counties of Idaho, and the northern half of Malheur County, Oreg.

[68] U. S. Department of Interior, Bureau of Reclamation: *Snake Basin above Lewiston, Idaho*, Project Investigations Report 43, March 1940.


APPROXIMATE PRESENT IRRIGATED AREAS
▨ COMPACT IRRIGATION
° ₒ °ₒ ○ SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
▤ NEW DEVELOPMENT AREAS
▨ SUPPLEMENTAL DEVELOPMENT
* Indication of areas on map neither implies detailed investigation nor assures development.
1/A1 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
Grangeville
SALMON
SNAKE RIVER
ADAMS
Payette Lake
1/B1
Council
1/U
R.
BOISE
Payette
Arrow
Res
10 0 10 20 30
STATUTE MILES

COMPILED BY

BUREAU OF AGRICUTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD

SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
U.S. GEOLOGICAL SURVEY
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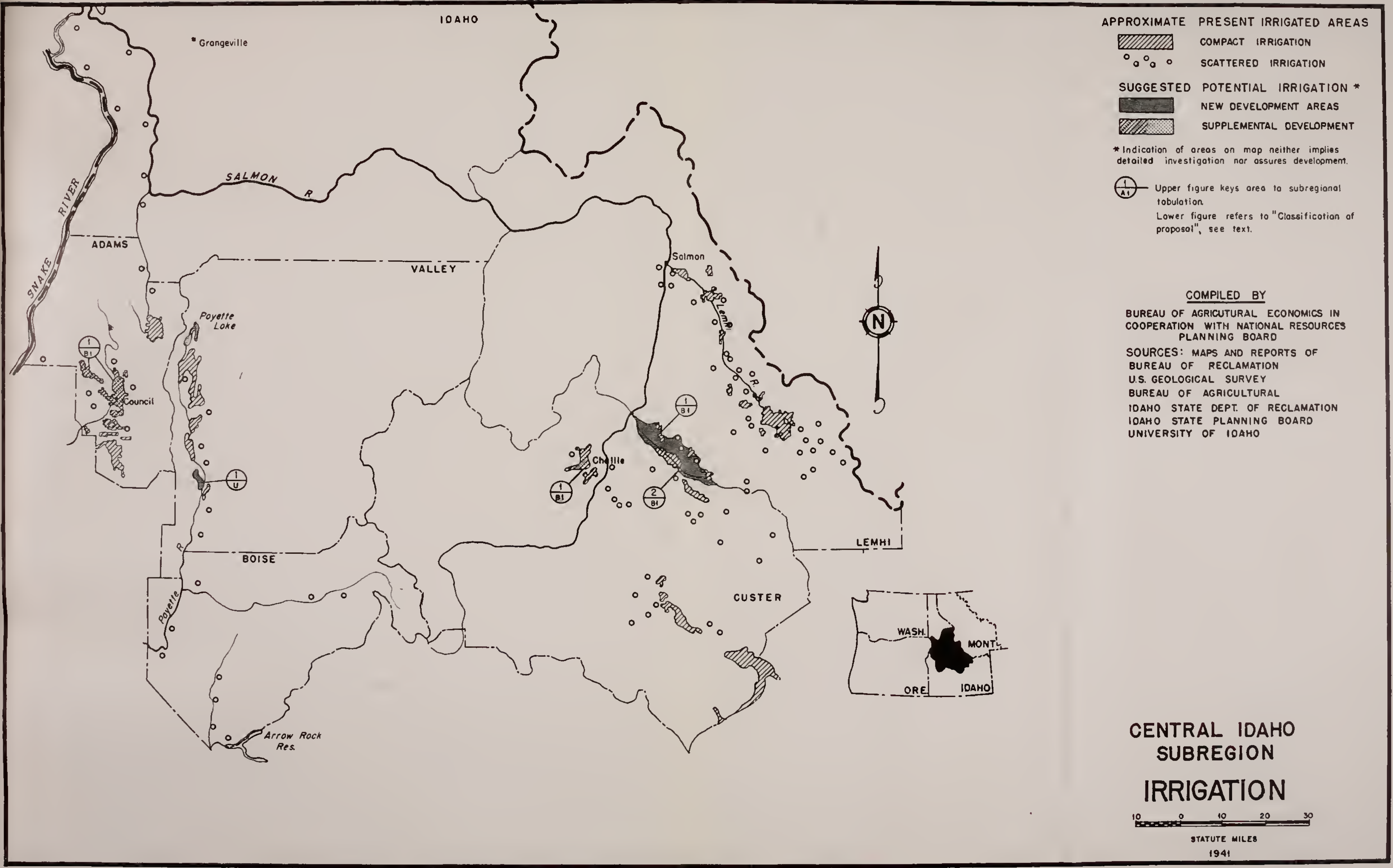
IDAHO STATE DEPT. OF RECLAMATION
IDAHO STATE PLANNING BOARD
UNIVERSITY OF IDAHO

CENTRAL IDAHO SUBREGION

IRRIGATION

1941


APPROXIMATE PRESENT IRRIGATED AREAS
▨ COMPACT IRRIGATION
○ SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
■ NEW DEVELOPMENT AREAS
▨ SUPPLEMENTAL DEVELOPMENT
* Indication of areas on map neither implies detailed investigation nor assures development.
1/A1 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
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IDAHO STATE PLANNING BOARD
UNIVERSITY OF IDAHO
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CENTRAL IDAHO SUBREGION
IRRIGATION
10 0 10 20 30
STATUTE MILES
1941
IDAHO
Grangeville
SALMON R
SNAKE RIVER
ADAMS
VALLEY
Payette Lake
Council
1/B1
1/U
R
BOISE
Payette
Arrow Rock Res.
Salmon
Lemhi R.
Challis
1/B1
1/B1
2/B1
LEMHI
CUSTER
WASH.
MONT.
ORE.
IDAHO

FIGURE 27

APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

○ SCATTERED IRRIGATION

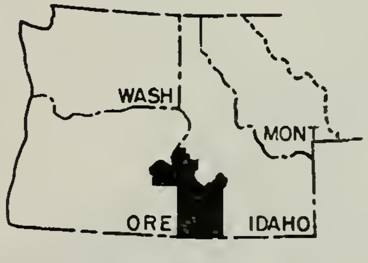
SUGGESTED POTENTIAL IRRIGATION*

▤ NEW DEVELOPMENT AREAS

░ SUPPLEMENTAL DEVELOPMENT

*Indication of areas on map neither implies detailed investigation nor assures development.

$\frac{3}{82}$ — Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.



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INDIAN SERVICE
IDAHO STATE DEPT. OF RECLAMATION
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OREGON RECLAMATION COMMISSION
OREGON STATE COLLEGE

SOUTHWESTERN IDAHO SUBREGION

IRRIGATION

10 0 10 20 30
STATUTE MILES

1941

APPROXIMATE PRESENT IRRIGATED AREAS

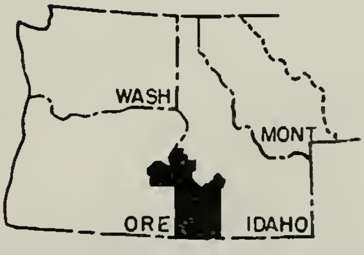
▨	COMPACT IRRIGATION
○ ○ ○ ○ ○	SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION*

▤	NEW DEVELOPMENT AREAS
▒	SUPPLEMENTAL DEVELOPMENT

*Indication of areas on map neither implies detailed investigation nor assures development.

$\frac{3}{B2}$ — Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.



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OREGON STATE COLLEGE

SOUTHWESTERN IDAHO SUBREGION

IRRIGATION

STATUTE MILES

1941

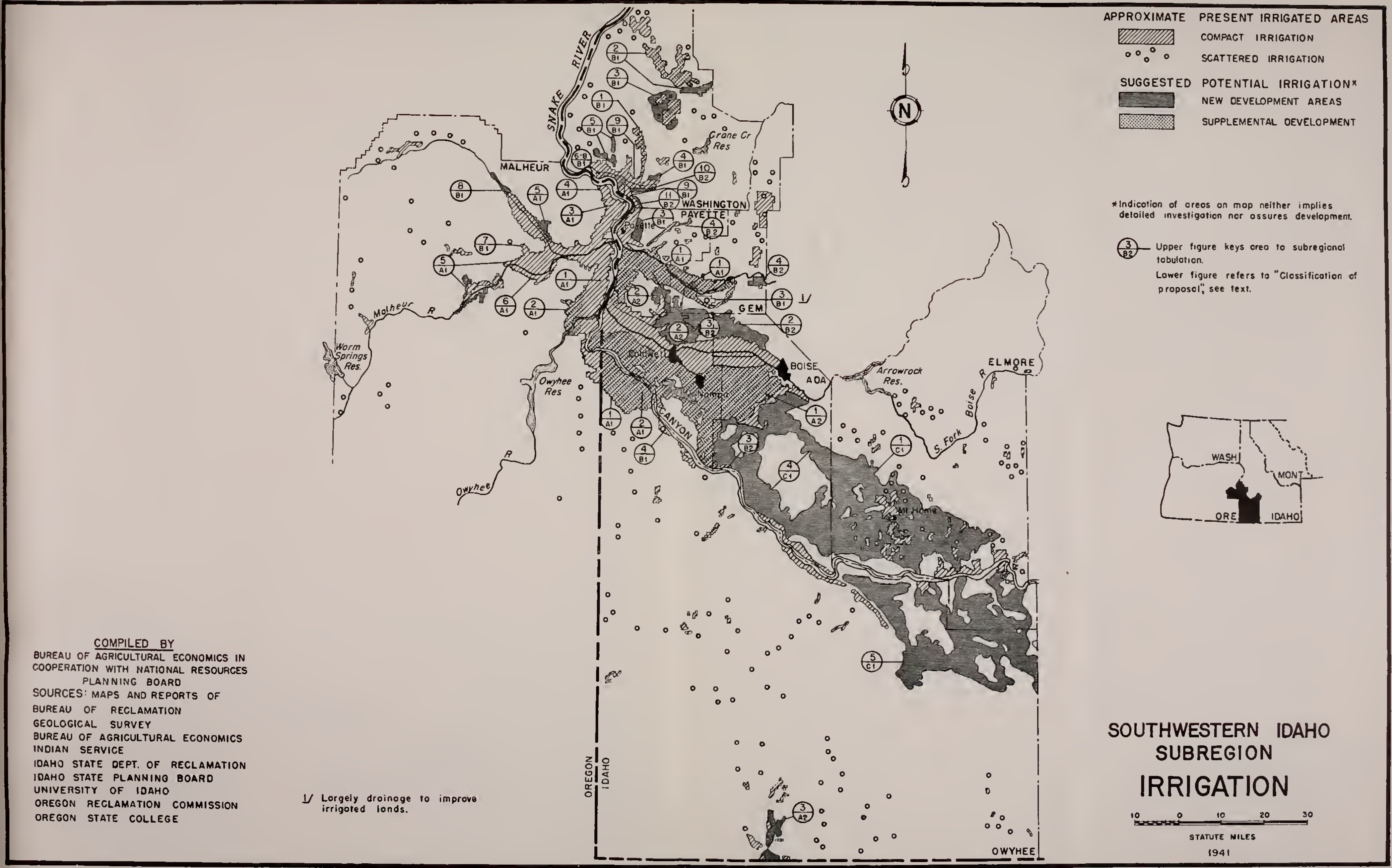
APPROXIMATE PRESENT IRRIGATED AREAS
▨ COMPACT IRRIGATION
° ° ° ° SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
■ NEW DEVELOPMENT AREAS
▒ SUPPLEMENTAL DEVELOPMENT
*Indication of areas on map neither implies detailed investigation nor assures development.
3/B2 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.
N
SNAKE RIVER
MALHEUR
WASHINGTON
PAYETTE
Payette
GEM
BOISE
ADA
ELMORE
CANYON
OWYHEE
Caldwell
Nampa
Boise
Mt Home
Crane Cr Res
Malheur R
Worm Springs Res.
Owyhee Res
Owyhee R
Arrowrock Res.
S. Fork Boise R
OREGON
IDAHO
1/
WASH
MONT
ORE
IDAHO
1/B1
2/B1
3/B1
4/B1
5/B1
6-8/B1
7/B1
8/B1
9/B1
10/B2
11/B2
3/B1
4/B2
1/A1
1/A1
1/A1
2/A1
3/A1
4/A1
5/A1
5/A1
6/A1
2/A2
2/A2
3/B2
3/B1
2/B2
4/B2
1/A2
1/A1
2/A1
4/B1
3/B2
4/C1
1/C1
5/C1
3/A2
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
GEOLOGICAL SURVEY
BUREAU OF AGRICULTURAL ECONOMICS
INDIAN SERVICE
IDAHO STATE DEPT. OF RECLAMATION
IDAHO STATE PLANNING BOARD
UNIVERSITY OF IDAHO
OREGON RECLAMATION COMMISSION
OREGON STATE COLLEGE
1/ Largely drainage to improve irrigated lands.
SOUTHWESTERN IDAHO SUBREGION
IRRIGATION
10 0 10 20 30
STATUTE MILES
1941

FIGURE 28

of the Mountain Home project. The investigations also indicate possibilities of developing other portions of the Mountain Home project and the Bruneau project; further investigation of these possibilities is in progress.

New Farm Possibilities

Approximately 9,200 new farms could be developed by all the proposals listed in the inventory. Of the 1,349 new farms that would result from projects recently constructed or now judged feasible for construction, many have been or are now being actively settled. Farms that might result from projects needing some further investigation total 933. Most of these farms would result from improvement and extension of existing irrigation project areas. Projects that need much more investigation to determine their feasibility offer the greatest possibilities for the development of new farms. Some 7,000 potential farms are involved in such proposals. It is probable that further investigation, however, will eliminate some projects and thereby reduce the number of potential farms.

Probable Types of Farming and Sizes of Farms

Physical conditions in this subregion are such that a considerable range in farm types is possible. Of the possible farming types, general, dairy, farm livestock, and fruit farms have been suggested for the areas proposed for development. These are the types of farms that experience has shown offer the greatest chance of success.[69] General farming is suggested for 93 percent of new farms, dairy farming for 5 percent, and farm livestock enterprises for 2 percent.

The 8,580 general farms suggested for development would consist of 80 acre units with 50 to 70 acres irrigated. Diversified crop and livestock production would be typical, but considerable variation between farms is expected. A general farm [70] is expected to have approximately 20 to 30 acres in alfalfa, 15 acres in small grain, 5 to 10 acres in sugar beets and other crops, and from 5 to 10 acres in irrigated pasture. Livestock maintained on the farm would consist of about 6 dairy cattle, 15 other cattle, 18 to 20 hogs, and 45 chickens. The general crop and livestock farm was suggested as a probable development in nearly all the areas proposed for development. The most extensive areas in which general farming would develop are the Mountain Home project and the Bruneau project, but for both areas there was a recognized lack of information to permit determining more definitely the probable types of farms.

Approximately 440 dairy farms were suggested for potential development. The most frequently suggested size for this type of farm was 60 to 70 acres with 50 to 60 acres irrigated. These units would be somewhat larger than the usual dairy farms, but the larger units were suggested principally because the areas proposed for development were less favorably situated than existing units. Crops grown on dairy farms would be quite similar to those of the general farms; alfalfa, clover, and small grains would predominate. Dairy cows and other cattle would be the most important livestock, but a few sheep, hogs, and chickens would also be maintained. The principal differences between dairy and general farms are the size of the farm, the acreage devoted to sugar beets, and the number of hogs maintained.

About 170 farms are suggested as possible general livestock units. The frequently suggested size of these farms is 100 acres with 60 acres irrigated. Such units would emphasize alfalfa and grain in about the same proportion as the general farms. The acreage devoted to irrigated and dry pasture would be larger than for the general farm. Cattle are suggested as the principal type of livestock. Farms of this type are suggested for small areas to be improved principally for the benefit of existing farms.

A very small number of fruit farms are suggested as a possible development in the Weiser Flats area. The units would consist of 40 acres, of which 35 would be irrigated. Tree fruits are suggested as the main crop.

Classification of Proposals

In contrast to the majority of subregions, southwestern Idaho has a higher proportion of class A proposals than class B, because irrigation is now actively going forward. Thus, while there are some 1,349 farm units in connection with projects recently completed or under consideration for construction, there are but 933 farm units in the class B categories. As is the case in several subregions, class C proposals involve the largest acreage and the greatest number of potential farms. This group of proposals accounts for 7,000 of the new-farm possibilities.

Class A proposals embrace about one-third of the total acreage and would provide 15 percent of the new farms. About 87,600 acres in class A proposals would be developed primarily to supply new farms, whereas 323,800 acres, constituting the remaining acreage in class A, would primarily benefit existing well-developed land. Most of the new units in class A proposals are expected to be general farms, 26 percent may become dairy farms, and 7 percent are expected to be livestock units.

Class B proposals involve only about 131,000 acres and 933 new farms. They account for slightly less than 11 percent of the total acreage and only 10 percent of the

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[69] Heisig, Carl P. and Clawson, Marion. *Migration and Settlement on the Pacific Coast*, Report No. 4, Bureau of Agricultural Economics in cooperation with Oregon Agricultural Experiment Station and Farm Security Administration, Washington, January, 1941.

[70] *Ibid.*, p. 45.

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Class B proposals involve only about 131,000 acres and 933 new farms. They account for slightly less than 11 percent of the total acreage and only 10 percent of the new farms. About two-thirds of the acreage would be improved to provide new farms, and the remaining one-third would benefit existing farms. General farms are expected to develop on the majority of class B proposals. A small acreage would develop as dairy, farm livestock, and fruit farms.

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[69] Heisig, Carl P. and Clawson, Marion. *Migration and Settlement on the Pacific Coast*, Report No. 4, Bureau of Agricultural Economics in cooperation with Oregon Agricultural Experiment Station and Farm Security Administration, Washington, January, 1941.

[70] *Ibid.*, p. 45.

Class C proposals account for 690,000 acres, which is 56 percent of all land proposed for development in the subregion. Most of this land is unimproved, and the proposed development is expected to create about 7,000 new farms. Present recommendations indicate that most of these units should be devoted to general farming.

SOUTHEASTERN IDAHO SUBREGION

Acreage in Development Proposals

Summarized proposals for land development in southeastern Idaho [71] involve a total of nearly 1,664,000 acres of land. All the proposals involve either supplemental or new irrigation.[72] The supplemental irrigation will primarily benefit existing farms whereas new irrigation will primarily supply new farms. Without irrigation, agriculture in the semiarid section would be limited to grazing and dry farming, which support a relatively sparse population. With irrigation, it has been possible to develop over 1.6 million acres [73] of cropland for intensive cultivation. This cropland is the basis of an agricultural economy that now directly supports on the farms 65 percent of the total population of the area.

Supplemental irrigation has been proposed for over 1,109,000 acres, or for about two-thirds of the present irrigated area. This is generally regarded as the primary need, because it affects so large a portion of the existing cropland now in farms and because it would improve farm income by reducing water shortages, which curtail production. The improvements suggested are either to provide water during years of low precipitation or to increase the late season supply of water for lands now only partially irrigated.

Since the needed water for supplemental irrigation must be drawn from limited supplies, such developments will probably have precedence over proposals to irrigate new lands. However, early priority for supplemental water will not exclude the possibility of simultaneous development of new irrigation. Proposed storage will facilitate certain exchanges of water rights, which may bring about more efficient use of water in some sections and which may provide a full supply to some new lands.

New irrigation is suggested for nearly 555,000 acres. This area would increase present irrigated cropland acreage available for intensive agriculture by nearly 30 percent. New irrigation involves such sharp increases in investment, in costs of operation, and in intensity of production that, for the most part, the existing pattern of large ownerships is not adapted to efficient use of newly irrigated land. Hence, new irrigation in this subregion would result in the creation of new farms through subdivision.

New Farm Possibilities

A total of about 5,350 new farms might be provided in the subregion by all inventoried suggestions for de-

TABLE 20.—*Southeastern Idaho subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	1, 663, 959	1, 109, 251	554, 708	5, 351
Class A	21, 608	3, 000	18, 608	192
Class B	1, 324, 151	1, 079, 051	245, 100	2, 667
Class C	318, 200	27, 200	291, 000	2, 492
IRRIGATION				
Total irrigation	1, 663, 959	1, 109, 251	554, 708	5, 351
Class A1	4, 608	3, 000	1, 608	22
Class A2	17, 000	------------	17, 000	170
Class B1	1, 175, 471	980, 371	195, 100	2, 297
Class B2	148, 680	98, 680	50, 000	370
Class C1	218, 000	27, 200	191, 000	2, 467
Class C2	5, 000	------------	5, 000	25
Class C3	95, 000	------------	95, 000	------------

[1] For detailed tabulation of projects see appendix, table 13.
[2] For definition of various classes see p. 38.

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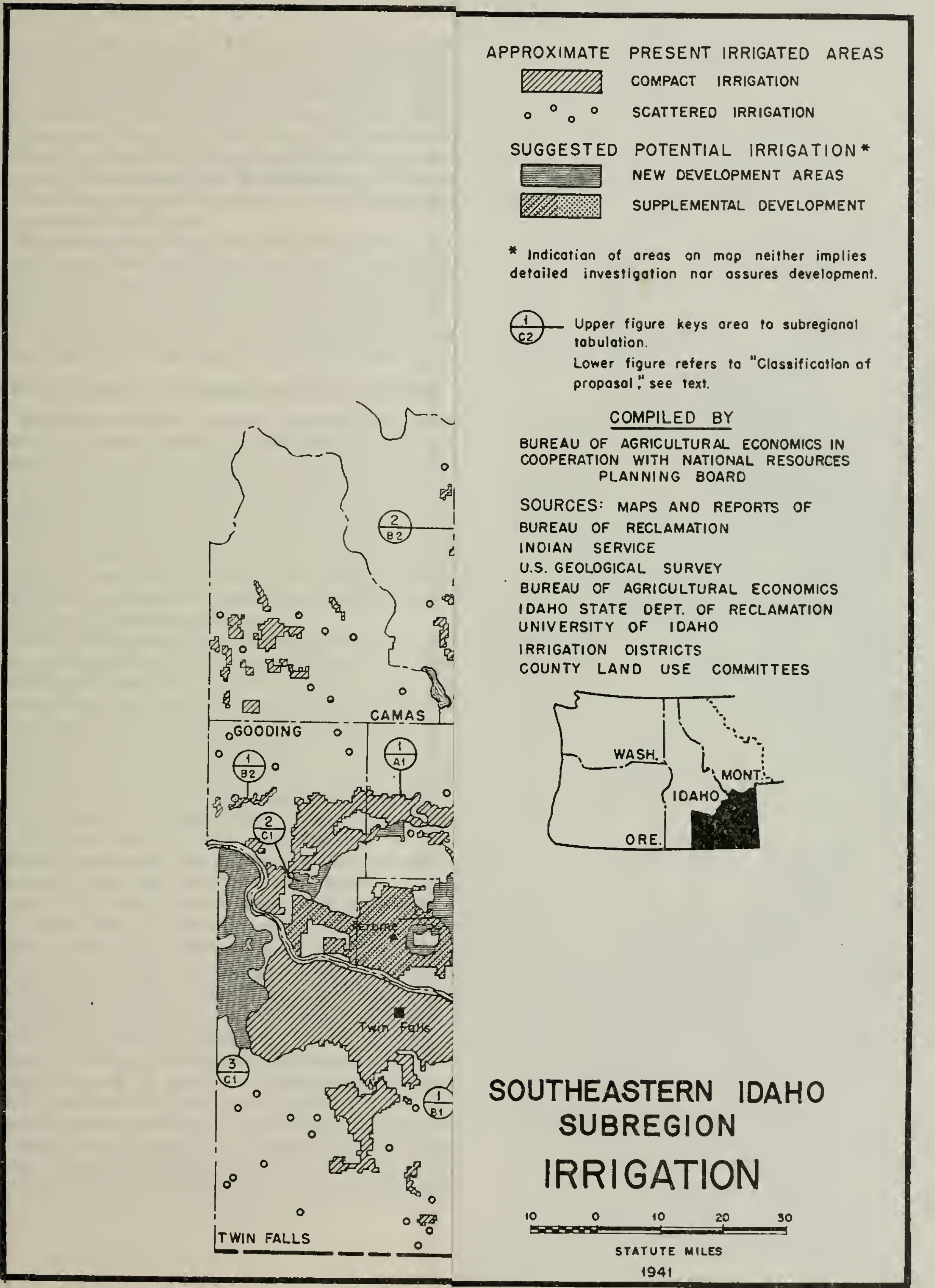
[71] The southeastern Idaho subregion consists of Bannock, Bear Lake, Bingham, Blaine, Bonneville, Butte, Camas, Caribou, Cassia, Clark, Franklin, Fremont, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Oneida, Power, Teton, and Twin Falls Counties of Idaho. The subregion also includes the two well recognized drainage basins—Upper Snake Basin above Milner and the Idaho portion of Bear River Basin.

[72] In Bear Lake County, it is locally recognized that an undetermined acreage of land north of Bear Lake might be benefited by drainage. Such proposals, however, have apparently not reached the status of definite projects which could be included in this inventory. Recent proposals for irrigation usually include plans for necessary drainage. Thus, although drainage will be a complementary development of new irrigation, it is not specifically listed in this subregional inventory.

[73] Total irrigated acreage of the subregion was derived as follows:

1, 037, 161 acres irrigated 1939 from Fall River, Henry's Fork, Teton River, and Snake River direct—Heise to Milner, Crandall, L., *Watermaster's Report, District 36,* 1939 Irrigation season.
47, 500 acres irrigated Mud Lake area, Hoyt, W. G., U. S. G. S. *Water Supply Paper 657,* 1935.
396, 220 acres irrigated by tributaries to Snake—Heise to Milner. Hoyt, W. G., U. S. G. S. *Water Supply Paper 657,* 1935.
161, 725 acres irrigated in Idaho portion Bear River basin. Idaho State Planning Board, *Drainage Basins in Idaho,* 1937.

1, 642, 606 acres total.



APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

○ SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION *

▩ NEW DEVELOPMENT AREAS

▧ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

1/C2 Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal," see text.

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IRRIGATION DISTRICTS
COUNTY LAND USE COMMITTEES

SOUTHEASTERN IDAHO SUBREGION

IRRIGATION

1941

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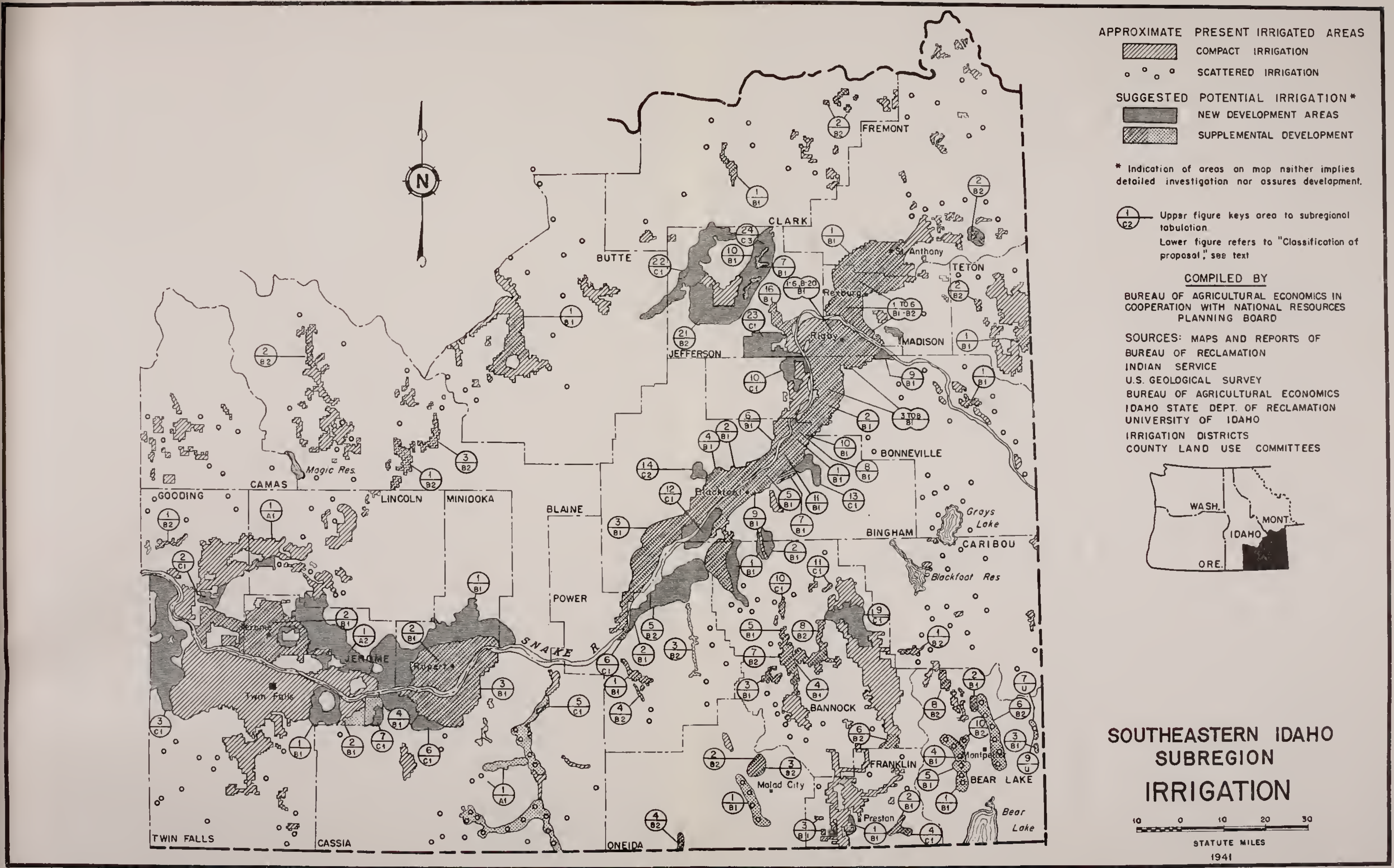
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SOUTHEASTERN IDAHO SUBREGION
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FREMONT
CLARK
BUTTE
St. Anthony
TETON
Rexburg
JEFFERSON
MADISON
Rigby
BONNEVILLE
CAMAS
Magic Res.
GOODING
LINCOLN
MINIDOKA
BLAINE
Blackfoot
BINGHAM
Grays Lake
CARIBOU
Blackfoot Res
POWER
SNAKE R.
Jerome
JEROME
Rupert
Twin Falls
BANNOCK
FRANKLIN
Malad City
Montpelier
BEAR LAKE
Preston
Bear Lake
TWIN FALLS
CASSIA
ONEIDA

Figure 29

velopment. This number of farms is determined, with due consideration of local experience, by comparison of sizes and types of successful farms in areas having physical conditions similar to those in proposed areas. Most of these new farms would result from the extension of irrigation to new land. Few new farms are expected to result from supplemental developments, since farms in the existing irrigated areas have already become well adjusted in size and type.

Classification of the proposals and the new farms that might result from them show that class A proposals, or those now feasible, would create 192 farms. Class B proposals, or those in need of further investigation, involve 2,667 farms. Class C proposals, or those indicating long-term lack of feasibility, involve 2,492 farms.

Probable Types of Farming and Sizes of Farms

Within the range of crops that can be grown under prevailing natural conditions, five general types and sizes of farms appear likely to develop in the areas inventoried. General, crop-specialty, dairy, farm-livestock. and range-livestock farms have proven to be well suited to the varied conditions of the subregion. As the types of farming become more intensive, water shortage becomes a more critical factor in successful farming. Sufficient water supply is, therefore, an important factor in the type of farming practiced.

Three related farm types are the general farm, the crops-specialty farm, and the dairy farm. Each type would utilize from 80 to 100 acres. The principal differences between the types is the degree of crop or livestock emphasis. General farms do not emphasize any one crop. In this subregion, the principal crops are alfalfa, grain, sugar beets, and farm livestock, either beef or sheep. Crop specialty farms emphasize production of sugar beets, beans, peas, potatoes, and onions. Dairy farms, however, more nearly compare with the general farms; such crops as grain, alfalfa, and sugar beets are grown, but dairying is emphasized.

Any of the three types of farms are suggested where soils are suitable for intensive crop production, where growing seasons are sufficiently long and where irrigation water is available late enough to mature sugar beets and other specialized crops. These conditions are met principally in the Snake Plain adjacent to the Snake River and in the lower Bear River valley in Franklin County. In these valleys, soils are generally suited to root crops such as sugar beets, potatoes, and onions. Here, too, elevations are less than 5,000 feet and the growing seasons, accordingly, are 100 days or longer. A growing season of this length is sufficient for specialized crops. Generally, the water supply from both the Snake and Bear Rivers is available late in the season when it is needed for specialized crops.

The majority of farms of this type would develop adjacent to irrigated areas already well served by markets and transportation facilities. Thus, these services could easily be extended to the new areas. Lands proposed for development near Mud Lake and Dubois in Jefferson and Clark Counties, however, would be far distant from the major centers of population. Their development will require considerable extension of public services.

The other two types of farms emphasize livestock production. The farm-livestock type of unit usually consists of 60 to 100 acres irrigated and 100 to 200 acres dry. Farm-livestock units usually produce intensive crops on the irrigated land and grain on a portion of the dry land. Range-livestock farms usually consist of 320 to 640 acres with 160 acres irrigated. This unit is a feed base to supplement range-livestock operation. Use of adjacent range is anticipated. If Forest or Taylor grazing permits are not obtainable, either additional acreage of range land would be needed, or the irrigated portion of the farm would have to be larger. Considerable variation in size of range-livestock farms is anticipated to meet local conditions. The majority of the livestock farms would be located in high tributary valleys at average elevations of 5,000 feet, where climatic conditions do not favor intensive-crop production and where the farms would be adjacent to the range. Farm-livestock units, on the other hand, are usually suggested where climatic, soil, and water-supply conditions are fairly favorable for intensive feed crop production. Both types of farms are expected to develop where there is a frost hazard during growing seasons of less than 100 days and where short water supplies would usually limit production of winter-feed crops such as hay and grain. Soils as a limiting factor are less important in these areas. Often, the surface texture of these soils is as favorable as those in the Snake Plain and Lower Bear River Valley, where more intensive farming is practiced.

Classification of Proposals

Class A suggested proposals include 21,608 acres, of which supplemental development is suggested for 3,000 acres and new development for 18,608 acres. Completion of these projects is expected to result in the creation of 192 farms. Most of these units would probably be the general diversified type of about 80 acres, principally in alfalfa, but with some specialized crops such as sugar beets, beans, and onions and with farm flocks of sheep, beef cattle, and hogs. A few of the farms would be of a range-livestock type, based on beef and sheep production.

Class B proposals include 1,324,151 acres. More than 80 percent of this acreage requires supplemental water.

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Class B proposals include 1,324,151 acres. More than 80 percent of this acreage requires supplemental water.

New development would improve 245,100 acres, but it is this portion which, it is expected, might result in about 2,607 farms if present recommendations are followed. Augmented water supplies to existing farms are expected to result in 60 additional farms. While it is recognized that these supplemental developments may result in a number of additional farms through subsequent subdivision, it does not appear that supplemental improvements will bring many opportunities for subdivision in view of the present size of most developed farms and in view of present recommendations for an optimum size of family farm.

Of all potential new farms in the B class of proposals, about 82 percent would be of a general diversified type of farm, 12 percent are expected to be crop specialty farms, and 1 percent is expected to develop into dairy farms. The larger livestock farms would form the remaining 5 percent.

Class C proposals involve 318,200 acres. New development is suggested for 291,000 acres and supplemental development for 27,200 acres. Since 92 percent of the area in the C classification was suggested for new development, this group would, if constructed, create a large number of new farms (about 2,400). Nearly 70 percent of these would be general farms. The rest would be dairy, crop specialty, and livestock units.

NORTHWESTERN MONTANA SUBREGION

Acreage in Development Proposals

Possibilities for land development are of particular interest in this subregion[74] because of the recent migration of population into the area. The inventory for the subregion lists proposals involving a total of over 260,000 acres. The proposals would develop lands under two different sets of conditions.

In the northern and western parts of the subregion, particularly in Sanders, Lincoln, and Flathead Counties, one set of conditions prevails. The annual precipitation of 15 to 20 inches is sufficient to support a forest cover in the valley bottoms. Here also, the summer rainfall is sufficient to permit some crops to be successfully grown without irrigation. Under these conditions, agricultural land is being developed principally by clearing timber or stumps and to a lesser extent by supplemental irrigation. Proposals inventoried that involve some clearing would improve 34,680 acres, of which 6,000 acres would need clearing alone, and 28,680 acres would need both clearing and irrigation. In addition, there is a much larger acreage that is being cleared by individual action for which definite proposals have not been made and which, therefore, are not inventoried. Many of the individuals undertaking to develop farms by clearing are recent migrants. While they have succeeded in developing a limited amount of land, it is often so small that income from the farm falls far below that needed by the average family.[75]

In the central and southern counties, particularly Lake, Missoula, and Ravalli, a different set of conditions exists. The annual precipitation of 12 to 16 inches barely supports a thin scattered forest cover in the valley bottoms and is sufficient only for early maturing crops. Here agricultural land has been developed principally by means of irrigation. Proposals for land development by irrigation involve a total of 254,336 acres, which is by far the largest portion of the acreage proposed for development in the subregion. About 244,000 acres of the land proposed for irrigation would be for the benefit of present farms. Development would reduce seasonal and annual water shortages where irrigation is a critical need and would supplement rainfall deficiencies where it is not so necessary. These supplemental irrigation proposals are located principally in Missoula County, Ravalli County, and in the Flathead project of Lake County. Proposals for irrigation primarily to provide for new farms involve only 10,500 acres. The limited extent of this acreage reflects the limited opportunity to increase agricultural land in this mountainous area.

New Farm Possibilities

Combined irrigation and clearing proposals would make possible the creation of an estimated 954 new farms in this subregion. Irrigation developments, in addition to benefiting many existing farms, might yield 754 new farms. Clearing, alone or in combination with irrigation, while principally to benefit existing farms, is expected to create an additional 200 units. Not all these farms would be developed by proposals of equal merit; class A proposals are expected to develop 75 farm units; class B proposals, 254 farms; and class C proposals, 625 farms. Thus, it is apparent that relatively few farms could be provided through proposals that have been well investigated and are economically feasible. It is also apparent that proposals which might provide a major portion of the farms seem to have important factors limiting their feasibility.

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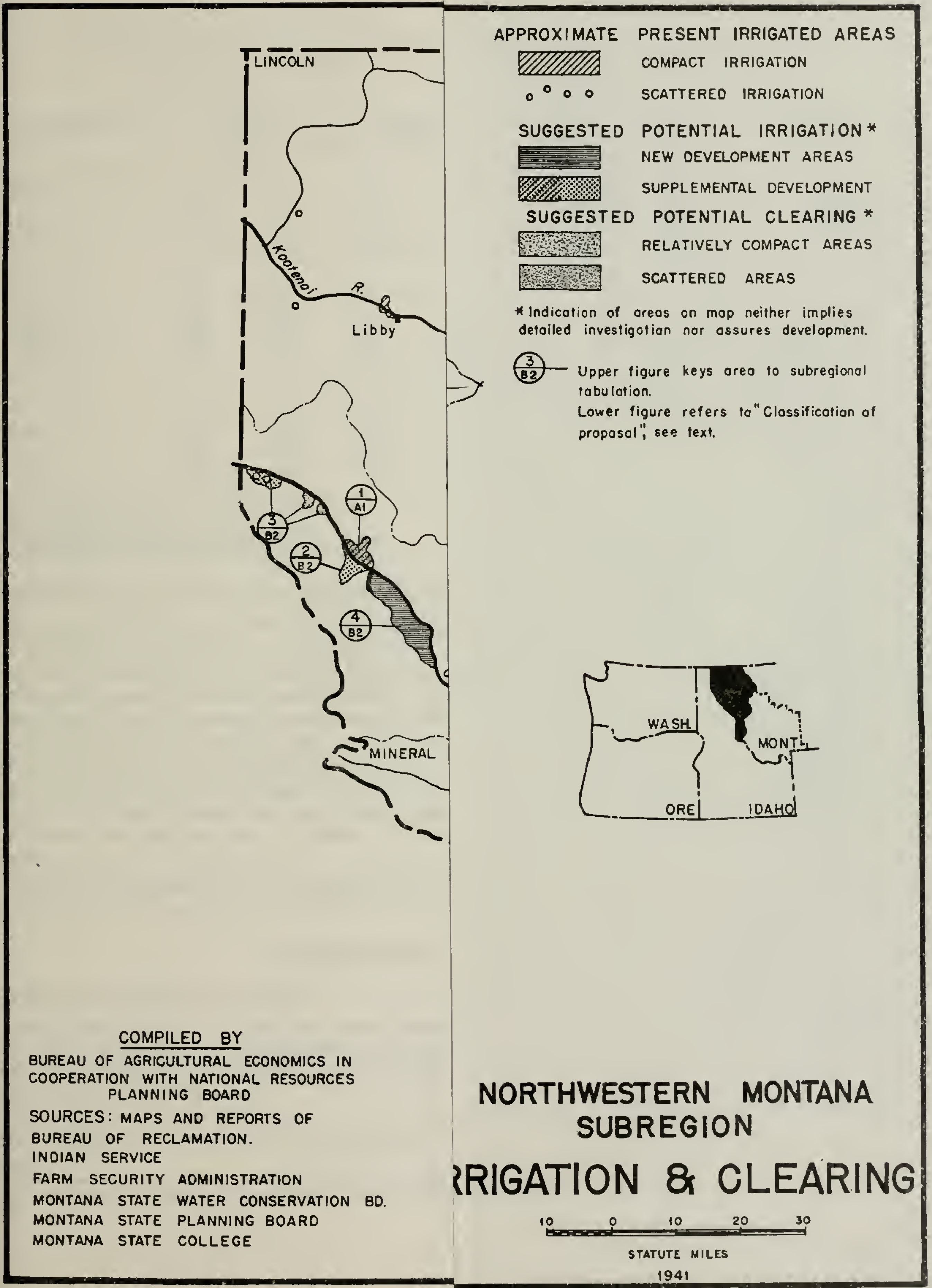
[74] Northwestern Montana subregion consists of Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders Counties.

[75] McKay, Maurice J., *Agricultural Conditions and Problems in Sanders County*, Mimeo. Cir. No. 28, Montana State College Agricultural Experiment Station, Bozeman, Mont., 1940; also Skeels, Dorr, *Land Settlement in Flathead County*, unpublished report to the Farm Security Administration, Bozeman, Mont.


LINCOLN
Kootenai R.
Libby
1 / A1
3 / B2
2 / B2
4 / B2
MINERAL
WASH.
MONT.
ORE.
IDAHO
APPROXIMATE PRESENT IRRIGATED AREAS
▨ COMPACT IRRIGATION
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SUGGESTED POTENTIAL IRRIGATION *
▨ NEW DEVELOPMENT AREAS
▨ SUPPLEMENTAL DEVELOPMENT
SUGGESTED POTENTIAL CLEARING *
▨ RELATIVELY COMPACT AREAS
▨ SCATTERED AREAS
* Indication of areas on map neither implies detailed investigation nor assures development.
3 / B2 Upper figure keys area to subregional tabulation. Lower figure refers to "Classification of proposal", see text.
10 0 10 20 30
STATUTE MILES

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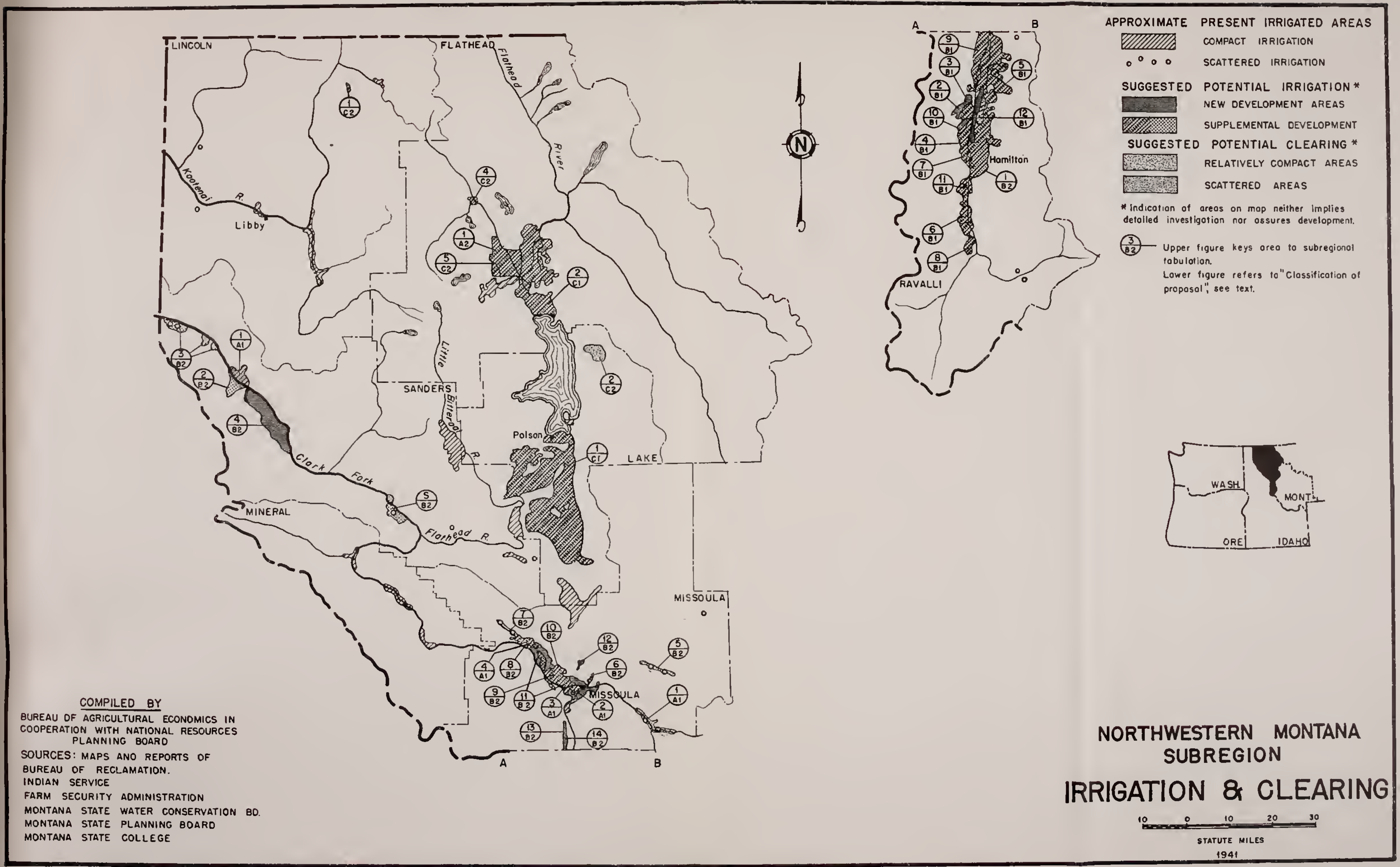
NORTHWESTERN MONTANA SUBREGION

RRIGATION & CLEARING

1941



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LINCOLN
FLATHEAD
Flathead River
Kootenai R.
Libby
SANDERS
Little Bitterroot R.
LAKE
Polson
MINERAL
Clark Fork
Flathead R.
MISSOULA
Missoula
RAVALLI
Hamilton
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N
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IDAHO
NORTHWESTERN MONTANA SUBREGION
IRRIGATION & CLEARING
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STATUTE MILES
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MONTANA STATE COLLEGE

FIGURE 30

Table 21.—*Northwestern Montana subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals [3]	260,336	244,836	15,500	954
Class A	31,800	31,800	------------	75
Class B	132,386	121,886	10,500	254
Class C	96,150	91,150	5,000	625
IRRIGATION				
Total irrigation	254,336	243,836	10,500	754
Class A1	20,800	20,800	------------	40
Class A2	10,000	10,000	------------	35
Class B1	37,159	35,659	1,500	54
Class B2	95,227	86,227	9,000	200
Class C1	84,150	84,150	------------	425
Class C2	7,000	7,000	------------	------------
CLEARING				
Total clearing	6,000	1,000	5,000	200
Class A	1,000 (680)	1,000 (680)	------------	------------
Class B	[4] (16,000)	(7,000)	(9,000)	(170)
Class C	5,000 (12,000)	------------ (12,000)	5,000 ------------	200 ------------

[1] For detailed tabulation of projects see appendix, table 14.

[2] For definition of various classes see p. 38.

[3] These exclude overlap as described in footnote 4 below.

[4] Figures in parentheses represent overlap of 2 or more types of development and are listed to indicate the total acres suggested for each type.

Probable Types of Farming and Sizes of Farms

Types and sizes of farms that have been suggested for potential developments take into consideration crops that can be successfully grown under the climatic conditions that prevail in these intermountain valleys. The three types of farms expected to develop are diversified general, dairy, and self-sufficing units. This range in farm types reflects the climatic differences between this subregion of Montana and those east of the Continental Divide. The higher rainfall and longer growing season in northwestern Montana favor diversified types of farming.

General farms suggested for the subregion most frequently would be 80 acres in size, with 60 acres irrigated. Hay and grain would be the principal crops, but sugar beets, potatoes, and peas could be successfully grown. Livestock would be maintained principally on the farm, although limited summer range is available. While general farms are suggested for projects in most parts of the subregion, they are expected to develop most frequently in Flathead County.

Dairy farms 40 to 80 or even 100 acres in size are also suggested as a possible farm type. On the 40-acre units all the land would be irrigated; on larger units, 60 to 80 acres would be irrigated. The crops of dairy farms would be similar to those of general farms, but the major emphasis would be on dairy products.

Self-sufficing units are not recommended for development, but it is expected that they will develop. Units of this type are expected to develop through the clearing of cut-over stump land. Gardens, pasture, and berries are the main basis of most self-sufficing units.

Classification of Proposals

From the full range of suggested proposals, 954 new farms might develop.

Class A proposals would develop 75 farms, although the proposals are primarily to benefit existing farms. It is expected that 40 of these new farms might be of general type and 35 of dairy type.

Class B proposals, or the secondary class, would make possible 254 new farms, of which 145 would result from new development and 109 in connection with proposals to improve existing farms. General farming could be expected on 225 farms and dairying on 29 farms.

Class C proposals, if undertaken, might create 625 farms. Of this group of improvements, those that would primarily benefit existing farms would create 425 farms, and those to improve new land would create 200. General farming is suggested as a probable type for 425 farms and a self-sufficing type of farm for the remaining 200 units.

SOUTHWESTERN MONTANA SUBREGION

Acreage in Development Proposals

Land development is proposed for nearly 342,000 acres in this subregion.[78] Irrigation proposals account for the greater part of the acreage, while drainage is suggested for only 3,494 acres.

Although range is the basic resource of this subregion, irrigation of a relatively small acreage is an important complement to its use. Depending on rainfall, the range varies greatly in livestock-carrying capacity from year to year. Unless the numbers of livestock grazed are adjusted to the carrying capacity of dry years, the range quickly becomes overgrazed. If, however, the numbers of livestock maintained are those that can best be carried by proper use of the range in most years, supplemental feed must be grown to support the stock in years of low carrying capacity. Irrigation is the principal means of stabilizing production of feed

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[78] The counties which comprise southwestern Montana are Beaverhead, Deer Lodge, Granite, Jefferson, Lewis and Clark, Powell, and Silver Bow.

[illegible]

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[76] The counties which comprise southwestern Montana are Beaverhead, Deer Lodge, Granite, Jefferson, Lewis and Clark, Powell, and Silver Bow.

Both irrigation and drainage are proposed to benefit intensive farming in Jefferson, and Lewis and Clark Counties. The purpose of the proposals is mainly to increase production and farm income.

Developments primarily to benefit present farms involve 255,234 acres, of which irrigation would benefit 251,740 acres and drainage 3,494 acres. The large acreage suggested for irrigation development reflects a lack of full water supply for much of the irrigated land. For the hay and grain crops most generally produced, the lack of a full-season water supply greatly restricts yields. If full water supplies are developed, more hay and grain could be produced, or more intensive crops could be grown.

TABLE 22.—*Southwestern Montana subregion—Summary of proposals for agricultural land development*[1]

Type of development and class[2] of proposals	Acreage suggested for development			Approximate number of new farms
	Total	Primarily to benefit present farms	Primarily for new farms	
Total included in all proposals	341,834	255,234	86,600	504
Class A	33,690	23,690	10,000	42
Class B	86,300	45,200	41,100	427
Class C	221,844	186,344	35,500	35
IRRIGATION				
Total irrigation	338,340	251,740	86,600	504
Class A1	4,000	2,000	2,000	13
Class A2	29,690	21,690	8,000	29
Class B1	42,600	32,600	10,000	182
Class B2	43,700	12,600	31,100	245
Class C1	93,760	79,010	14,750	20
Class C2	112,590	103,840	8,750	15
Class C3	12,000	----------	12,000	----------
DRAINAGE				
Total drainage	3.494	3,494	----------	----------
Class C1	3,494	3,494	----------	----------

[1] For detailed tabulation of projects see appendix, table 15.

[2] For definition of various classes see p. 38.

New irrigation is proposed to improve about 86,600 acres. This acreage represents an opportunity to increase the total cropland base. The lack of suitable land and sufficient water limits new irrigation possibilities.

New Farm Possibilities

Slightly more than 500 farms might be developed in this subregion. Forty-two of these farms would be developed by class A or primary suggestions. Four hundred and twenty-seven farms would be developed by class B or secondary suggestions. Thirty-five farms would be developed by class C or deferred suggestions. The large number of farm potentialities that fall in the secondary class indicates that most possibilities for development need further study to determine their feasibility.

Probable Types of Farming and Sizes of Farms

Four types of farms suggested for development in this area are general, truck, dairy, and livestock farms.

General farms are expected to develop on units of 120 to 160 acres, with 100 acres irrigated. Since general farms of this area emphasize livestock, a large proportion of the irrigated land is needed for hay production.

Truck farms have been suggested as a possibility for a small proposal involving land near the city of Butte. It is expected that nearby markets and the limited amount of land available for this use would make such enterprises successful. Twenty acres is thought to be sufficient for a farm unit.

Dairy farms, like general farms, are expected to consist of 120 to 160 acres, with 100 acres irrigated. Dairy farming is suggested as a possibility for certain areas at high elevations in Jefferson County. The cities of Butte and Anaconda offer nearby premium markets for dairy products, which the new developments might supply.

It is most frequently recommended that livestock farms consist of 320 to 640 acres, with 120 to 160 acres of irrigated cropland and about an equal amount of dry land. Such units would afford a feed base but would also require the use of range to maintain a family-size unit. The Big Hole basin, Red Rock River basin, and the northern part of Lewis and Clark County are the principal areas in which additional range livestock farms might develop.

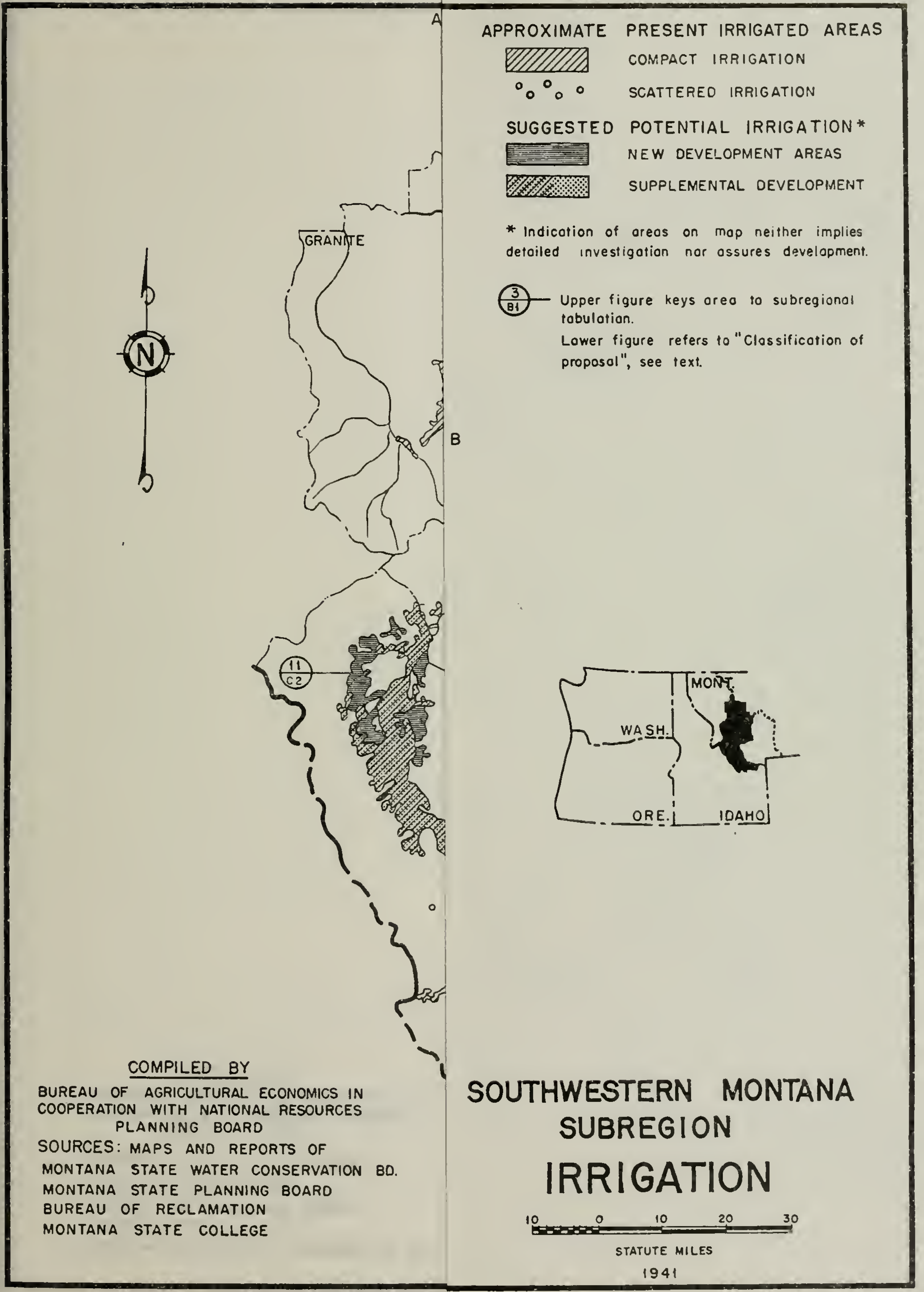
Classification of Proposals

Classification of the 341,834 acres proposed for development shows that only one-tenth of the acreage is now judged feasible for development, that one-quarter of it is of conditional feasibility or needs further investigation, and that two-thirds of it falls in the deferred group. In general, proposals for land development in this subregion need much more investigation before possibilities for developing new farms can be established.

Class A proposals would make possible only 42 new farms. Thirteen units are expected to develop as general farms and 29 as livestock farms. The general farms are expected to develop in Jefferson County and the livestock farms in Beaverhead County.

Class B proposals might make possible 427 farms, of which 225 would be general farms, 150 truck, 17 dairy, and 35 livestock farms. These units would develop in widely scattered locations in the subregion.

Class C proposals are estimated to provide only 35 farms, all of which would be livestock units. Most of these units would be located in Powell County.



APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

° ° ° ° ° SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION*

▤ NEW DEVELOPMENT AREAS

▨ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

(3/B1) Upper figure keys area to subregional tabulation.
Lower figure refers to "Classification of proposal", see text.

SOUTHWESTERN MONTANA SUBREGION
IRRIGATION

10 0 10 20 30
STATUTE MILES

1941

COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
MONTANA STATE WATER CONSERVATION BD.
MONTANA STATE PLANNING BOARD
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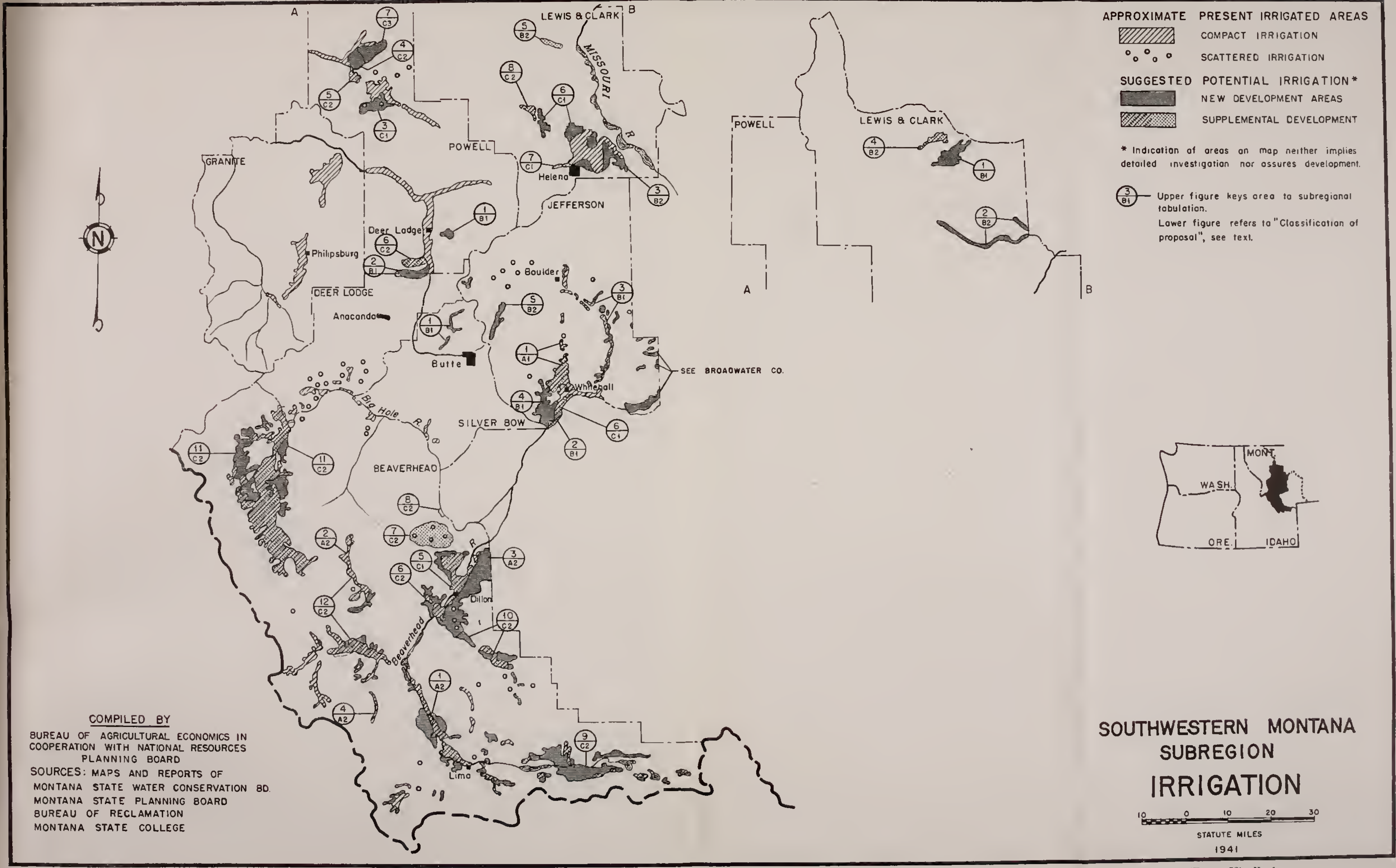
APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION*
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT
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SOUTHWESTERN MONTANA SUBREGION
IRRIGATION
10 0 10 20 30
STATUTE MILES
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SOURCES: MAPS AND REPORTS OF
MONTANA STATE WATER CONSERVATION BD.
MONTANA STATE PLANNING BOARD
BUREAU OF RECLAMATION
MONTANA STATE COLLEGE
N
A
B
LEWIS & CLARK
MISSOURI R
POWELL
GRANITE
DEER LODGE
JEFFERSON
SILVER BOW
BEAVERHEAD
Helena
Deer Lodge
Philipsburg
Boulder
Anaconda
Butte
Whitehall
Dillon
Lima
Big Hole R.
Beaverhead R.
SEE BROADWATER CO.
MONT.
WASH.
ORE.
IDAHO

FIGURE 31

APPROXIMATE PRESENT IRRIGATED AREAS

▨	COMPACT IRRIGATION
○ ○ ○ ○	SCATTERED IRRIGATION

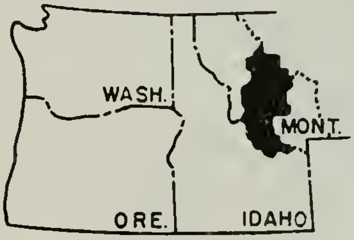
SUGGESTED POTENTIAL IRRIGATION*

▤	NEW DEVELOPMENT AREAS
▨	SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development

$\frac{3}{82}$ Upper figure keys area to subregional tabulation.

Lower figure refers to "Classification of proposal," see text.



COMPILED BY

BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD

SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
MONTANA STATE PLANNING BOARD
MONTANA STATE COLLEGE
MONTANA STATE WATER CONSERVATION BD.

SOUTH CENTRAL MONTANA SUBREGION

IRRIGATION

10 0 10 20 30
STATUTE MILES

1941

APPROXIMATE PRESENT IRRIGATED AREAS

▨ COMPACT IRRIGATION

○ ○ ○ ○ SCATTERED IRRIGATION

SUGGESTED POTENTIAL IRRIGATION*

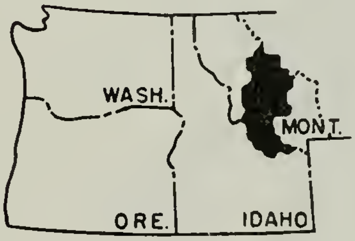
▦ NEW DEVELOPMENT AREAS

▨ SUPPLEMENTAL DEVELOPMENT

* Indication of areas on map neither implies detailed investigation nor assures development.

(3/B2) Upper figure keys area to subregional tabulation.

Lower figure refers to " Classification of proposal," see text.



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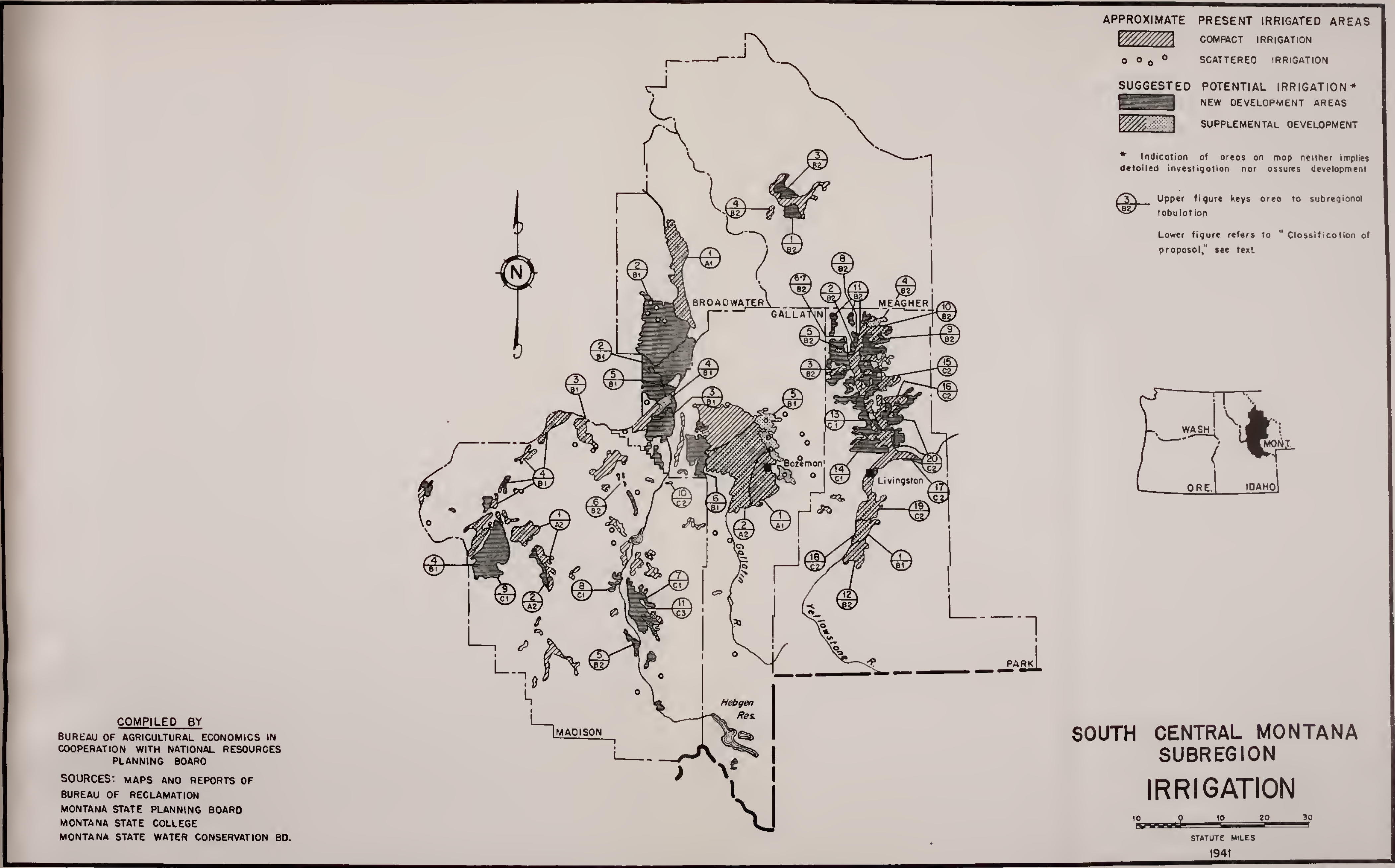
MONTANA STATE COLLEGE
MONTANA STATE WATER CONSERVATION BD.

SOUTH CENTRAL MONTANA SUBREGION

IRRIGATION

10 0 10 20 30
STATUTE MILES

1941



SOUTH CENTRAL MONTANA SUBREGION

IRRIGATION

1941

COMPILED BY
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SOURCES: MAPS AND REPORTS OF
BUREAU OF RECLAMATION
MONTANA STATE PLANNING BOARD
MONTANA STATE COLLEGE
MONTANA STATE WATER CONSERVATION BD.

FIGURE 32

SOUTH CENTRAL MONTANA SUBREGION

Acreage in Development Proposals

Land development is suggested for a total of about 723,000 acres in south central Montana.[77] The principal means of development is by irrigation.[78] Irrigation development, both to benefit present farms and to provide new farms, is a recognized need for a stabilized agriculture. Of the two purposes of irrigation, development to benefit farms already partially irrigated is of primary importance at present, whereas development to provide for new farms will become more important in the future.

Suggested proposals for supplemental irrigation involve 331,827 acres, or a major portion of the lands now irrigated in the subregion. Supplemental development is principally to control more adequately the available water supplies and to increase the water supply of users having junior water rights. Since supplemental development is proposed for farms already in operation, and since available water supplies are limited, it appears that these developments should occupy a prominent place in a land program. Moreover, supplemental irrigation may increase production sufficiently to encourage the creation of new farms through subdivision of some existing large units.

Suggested proposals for new irrigation involve 391,091 acres. If all this acreage were to be developed, irrigated land in the subregion would be doubled. Since the proposals for new development are suggested principally on the basis of physical characteristics of lands that might be irrigated and since there has been little investigation of water supplies, costs of water, and quality of the lands, it is not surprising that the acreage proposed is so large. Thus, while there is an abundance of land physically suitable for development by new irrigation in this subregion, the vital problem is to provide, at reasonable costs, adequate water supplies without interference with other users. Insofar as new irrigation can be developed within these limitations, it offers the major opportunity to provide new farms.

New Farm Possibilities

If economic feasibility be disregarded for the moment, a total of about 1,069 new farms could be developed on the basis of present conditions and in the light of local experience on similar lands. About 52 farms might result from subdivision of present farms, which would be too large to manage effectively if fully developed with supplemental water. New irrigation might make available about 1,000 farms, but proposals that could be readily developed would make possible only a small portion of that number. Proposals readily developed, that is, class A proposals, might create 110 farms, secondary or class B proposals would create an estimated 755 farms, and the deferred or class C proposals, 204 farms.

Probable Types of Farming and Sizes of Farms

A major portion of the potential farms (645 units) are expected to be general diversified crop and farm livestock units. Farms of this type would consist of about 160 to 320 acres; one-half the acreage might be in cash crops such as sugar beets, grains, and peas, and the other half in soil-conserving crops such as alfalfa. Livestock, principally beef and dairy cattle or farm flocks of sheep, would be kept to utilize forage crops and to provide a balanced farm plan that would maintain soil fertility. Farms of this type are most frequently recommended for project areas in the Missouri and Gallatin valleys of Broadwater and Gallatin Counties. The soils in these areas are light brown sandy to silt loams of good productivity under irrigation. Growing seasons in these valleys average slightly more than 100 days, but frost may occur in any month. These conditions preclude intensive farming, but general farming is fairly successful.

A smaller portion of the potential farms (459 units) might be developed as range livestock units. It is generally recommended that farms of this type should consist of 320 to 640 acres, with 120 to 160 acres of the

TABLE 23.—*South central Montana subregion—Summary of proposals for agricultural land development* [1]

Type of development and class [2] of proposal	Acreage suggested for development: Total	Acreage suggested for development: Primarily to benefit present farms	Acreage suggested for development: Primarily for new farms	Approximate number of new farms
Total included in all proposals	722.918	331,827	391,091	1,069
Class A	158.572	140,822	17,750	110
Class B	315,657	158,157	157,500	755
Class C	248,689	32,848	215.841	204
IRRIGATION				
Total irrigation	722.918	331,827	391,091	1,069
Class A 1	36,000	25,500	10,500	50
Class A 2	122,572	115,322	7,250	60
Class B 1	219,357	118,867	100,550	510
Class B 2	96,300	39,350	56,950	245
Class C 1	232,341	30,500	201,841	160
Class C 2	14,348	2,348	12,000	44
Class C 3	2,000	....	2,000	....

[1] For detailed tabulation of projects see appendix, table 16.
[2] For definition of various classes see p. 38.

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[77] The south central Montana subregion includes Broadwater, Gallatin, Madison, Park, and Meagher Counties.

[78] Two sizable areas of poorly drained land occur in the subregion. One area lies along the south bank of the East Gallatin River below the junction with Dry Creek. The other area lies along the east side of Madison River in Gallatin County. While the soil survey of the Gallatin Valley area, Mont., recognizes that these lands might be improved by drainage, definite projects were not discovered. For this reason the inventory does not list proposals for drainage.

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total being irrigated. If developed, these potential farms would be located principally in the Shields River valley of Park County, the Smith River valley near White Sulphur Springs in Meagher County, and in the Madison, Jefferson, and Ruby valleys of Madison County. The adaptability of these areas is virtually limited to hay and small grains since most of the lands proposed for development are subject to frost during the growing season. These crops have the advantage of best utilizing early season flood waters. Soils, although not thoroughly investigated, are thought suitable for development. The new developments are intended to increase production by extending the irrigation season (which now ends about July 1) to permit two and possibly three cuttings of alfalfa.

Classification of Proposals

Some 722,918 acres of land in this subregion are involved in the suggested proposals here classified. Slightly less than 22 percent of the acreage is included in class A proposals. About 44 percent is given a class B rating. The remaining 34 percent is in class C. The acreage involved in the proposals indicates that, while there are ample opportunities to develop new lands, some three-quarters of the proposed acreage needs more adequate investigation to determine feasibility.

Class A proposals involve 158,572 acres, of which 36,000 acres are under development and will receive the newly provided water this year. Supplemental water will be supplied to 25,500 acres and new irrigation water to 10,500 acres. The 122,572 acres remaining have been investigated sufficiently to indicate feasibility of development. Of this acreage, 115,322 acres should receive supplemental development; only 7,250 acres are suggested for new development. One hundred and ten new farms are expected to develop consequent to construction of class A proposals. The recommendations are that 50 farms be of the general type and that 60 farms be livestock units.

Class B proposals would develop 315,657 acres. Proposals judged sufficiently investigated to show that feasibility is dependent on short-term limiting factors involve 219,357 acres and would provide 510 new farms. The remaining 96,300 acres, needing further investigation, might make possible 245 farms—195 by new development and 50 by supplemental development. General farming is recommended for about 40 units and livestock farming for 200 units.

Class C proposals involve 248,689 acres, which are divided into three categories as follows: 232,341 acres for which investigation indicates lack of feasibility because of long-term limiting factors, 14,348 acres for which some study indicates that further investigation is unjustified under present conditions, and finally, 2,000 acres in proposals which have been abandoned or superseded. Class C proposals might make possible 194 livestock units and 10 general farms.

PART II

3. APPENDIX—PROJECT TABULATIONS BY SUBREGION AND BY COUNTY*

Tabular information for Pacific Northwest subregions, as to county classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities is contained in this Appendix. An index to these tables, by subregion, follows:

Subregion	Page
Blue Mountain Includes all of Baker, Grant, Union, Wallowa, and Wheeler Counties, Oreg.	81
Central Idaho Includes all of Adams, Boise, Custer, Lemhi, and Valley Counties, and part of Idaho County, Idaho.	84
Central Oregon Includes all of Crook, Deschutes, and Jefferson Counties, Oreg.	81
Central Washington Includes all of Adams, Benton, Chelan, Douglas, Franklin, Grant, Kittitas, Okanogan, and Yakima Counties, Wash.	83
Cowlitz-Willamette Includes all of Benton, Clackamas, Columbia, Linn, Marion, Multnomah, Polk, Washington, and Yamhill Counties, and part of Lane County, Oreg.; and all of Clark, Cowlitz, Lewis, and Skamania Counties, Wash.	78
Great Basin Includes all of Harney, Klamath, and Lake Counties, and part of Malheur County, Oreg.	80
Middle Columbia-Palouse Includes all of Gilliam, Hood River, Morrow, Sherman, Umatilla, and Wasco Counties, Oreg.; all of Asotin, Columbia, Garfield, Klickitat, Walla Walla, and Whitman Counties, Washington; and all of Nez Perce County, Idaho.	82
Northeastern Washington and Northern Idaho. Includes all of Ferry, Lincoln, Pend Oreille, Spokane, and Stevens Counties, Wash.; all of Benewah, Bonner, Boundary, Clearwater, Kootenai, Latah, Lewis, and Shoshone Counties, and part of Idaho County, Idaho.	83
Northwestern Montana Includes all of Flathead, Lake, Lincoln, Mineral, Missouli, Ravalli, and Sanders Counties, Mont.	88
Oregon-Washington coast Includes all of Clatsop, Coos, Curry, Lincoln, and Tillamook Counties, and part of Douglas and Lane Counties, Oreg.; all of Grays Harbor, Pacific, and Wahkiakum Counties, and part of Clallam, and Jefferson Counties, Wash.	77
Puget Sound Includes all of Island, King, Kitsap, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom Counties, and part of Clallam and Jefferson Counties, Wash.	76
South-central Montana Includes all of Broadwater, Gallatin, Madison, Meagher, and Park Counties, Mont.	90
Southeastern Idaho Includes all of Bannock, Bear Lake, Bingham, Blaine, Bonneville, Butte, Camas, Caribou, Cassia, Clark, Franklin, Fremont, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Oneida, Power, Teton, and Twin Falls Counties, Idaho.	86
Southern Oregon Includes all of Jackson and Josephine Counties, and part of Douglas County, Oreg.	80
Southwestern Idaho Includes all of Ada, Canyon, Elmore, Gem, Owyhee, Payette, and Washington Counties, Idaho, and part of Malheur County, Oreg.	85
Southwestern Montana Includes all of Beaverhead, Deer Lodge, Granite, Jefferson, Lewis and Clark, Powell, and Silver Bow Counties, Mont.	89

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*By Gilbert G. Stamm and Vincent M. Throop.

TABLE 1.—*Puget Sound subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
WASHINGTON												
Clallam County:												
1. Agnew area	2,000	1,200		2,000	800	1,200	Coast dairy, poultry	I-40	40			
								D-80	40	40	15	A.
2. Joyce area	11,000			11,000	6,000	5,000	do	80	40	40	75	A.
3. Carlsborg	4,300	2,500		4,300	1,800	2,500	do	I-40	40			
								D-80	40	40	40	B.
4. Dry Creek	4,200			4,200	800	3,400	do	80	40	40	10	B.
5. Fairview	6,880			6,880	1,000	5,880	do	80	40	40	12	B.
6. Port Angeles	4,800			4,800	800	4,000	do	80	40	40	10	B.
7. Sequim	5,200	3,000		5,200	2,200	3,000	Coast dairy	I-40	40			
								D-80	40	40	60	B.
8. Happy Valley Irr. Pr.	2,000	2,600				2,600	do	40	40		nr	C2.
Island County:												
1. Camano Island	750			750		750	Coast dairy, poultry	100	60	40	0	B.
2. Penn Cove North	3,000			3,000		3,000	do	100	60	40	0	B.
3. So. of Greenbank	1,500			1,500	1,500		do	100	60	40	15	B.
4. Useless Bay	3,000			3,000		3,000	do	100	60	40	0	B.
6. Clover Valley and Kingston.	1,000	*1,000				1,000	Coast dairy	40	40		0	B2.
Jefferson County:												
1. Land planning area 2	7,500		some	7,500	6,500	1,000	Coast dairy, poultry	80	40	40	90	A.
2. Land planning area 1	7,000			7,000	6,000	1,000	do	80	40	40	80	B.
3. Land planning area 3	750	some		750	700	50	do	80	40	40	9	B.
4. Valley areas	3,000	*3,000				3,000	Coast dairy	40	40		0	B2.
5. Quilcene Irr. Proj	12,000	12,000		some		12,000	Coast dairy, ltd. genl	40	40		0	C3.
King County:												
1. Enumclaw area	1,200			1,200		1,200	Dairying	40	40		0	A.
2. Auburn-Kent area	9,000	*9,000				9,000	Coast dairy, truck	20	20		0	B2.
Kitsap County:												
1. Loam area	300			300	300		Coast dairy	60	40	20	5	A.
2. Scattered peat	320		320	320	320		Coast dairy, truck	60	40	20	5	A.
3. Long Lake area	nr		nr				Coast dairy, berry, truck	40	40		nr	B1.
Mason County:												
1. Individual Irr	12,000	*12,000				12,000	Coast dairy, berry				0	B2.
2. Hammersly Inlet	5,700			5,700	4,200	1,500	do	140	35	105	50	C.
3. Harstine Is.	5,000		some	5,000	3,000	2,000	Grapes, poultry	20	15	5	150	C.
4. All other	15,000		some	15,000	7,500	7,500	Coast dairy, poultry	160	50	110	100	C.
Pierce County:												
1. Co. Wide Clearing	15,000			15,000		15,000	do	80	25	55	0	A.
2. Puyallup Valley Dev	6,000	*6,000				6,000	Diversified sm. fruit	10	10		0	B2.
3. Puyallup Tide Flats	600		600		600		Berries, truck	10	10		50	C2.
San Juan County:												
1. Lopez Island	3,000		200	3,000	2,000	1,000	Coast dairy, and mixed general	100	60	40	35	A.
2. Orcas Island	2,500			2,500	160	2,340	Coast dairy, limited, berry and truck.	80	25	55	2	B.
3. Shaw Island	600			600	600		Coast dairy, poultry	100	45	55	6	B.
4. Decatur Island	200			200		200	Coast dairy (ltd.)	100	45	55	0	B.
5. San Juan Island	600			600		600	Coast dairy, specialty	100	45	55	0	B.
6. Waldron Island	700			700	700		Coast dairy, genl. (ltd)	100	45	55	12	C.
Skagit County:												
1. Concrete	6,700			6,700	6,700		Coast dairy	100	80	20	67	A.
2. Sedro-Woolley E	5,000			5,000	5,000		do	80	60	20	60	A.
3. Marblemont	6,000			6,000	6,000		do	100	80	20	60	B.
4. Sedro-Woolley W	25,000			25,000		25,000	do	100	80		0	B.
5. Skagit delta	60,000	*60,000				60,000	Coast dairy, div. gen'l	40	40		0	B2.
6. Big Lake E	6,000			6,000	4,000	2,000	Coast dairy	160	120	40	30	C.
Snohomish County:												
1. Scattered Areas	10,000		some	10,000		10,000	Coast dairy, berry, poultry	65	35	30	0	A.
2. Snohomish	20,000		some	20,000	3,500	16,500	Coast dairy, berry	65	35	30	50	A.
3. Tulalip Ind. Res	2,000		800	1,200	2,000		Coast dairy	60	35	25	40	B.
4. Drainage D. #1	3,000		3,000			3,000	Coast dairy, berry	60	50	10	0	B2.
5. Lower River Bottoms	20,000	*20,000				20,000	Coast dairy, berry, truck	40	40		0	B2.
6. Arlington-Stanwood	50,000		some	50,000	7,000	43,000	Coast dairy, berry, poultry	70	35	35	100	C.
Thurston County:												
1. County Wide	24,000		4,600	24,000	16,000	8,000	do	80	40	40	200	A.
2. Yelm Irr. Dist	2,300	2,300				2,300	Coast dairy, berry, truck	30	30		0	B2.
Whatcom County:												
1. Clearbrook	2,400		some	2,400	1,200	1,200	Coast dairy, truck, poultry	60	40		20	A.
2. N. M. S. Forks Nooksack.	6,300			6,300	1,800	4,500	Coast dairy, poultry	60	50	10	30	A.
3. Scattered Clearing	50,000			50,000		50,000	do	60	50	10	0	A.
4. Goshen-Lawrence Ind	2,400			2,400	2,400		do	60	50	10	40	B.
5. Lummi-Blaine	7,500			7,500	6,000	1,500	do	60	50	10	100	B.
6. Bellingham	7,000			7,000		7,000	do	60	50	10	0	C.
7. Nooksook Bottoms	30,000	*30,000				30,000	Coast dairy, berry, poultry	40	40		0	C2.

* Largely individual irrigation systems to supplement summer rainfall.
I Irrigated.
D Dry.
nr No recommendation.

TABLE 2.—*Oregon-Washington coast subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
WASHINGTON												
Clallam County, part:												
1. Clallam Bay	19,800			19,800	14,000	5,800	Coast dairy	90	40	60	150	C.
2. Forks	15,000			15,000	7,500	7,500	do	90	40	50	75	C.
Grays Harbor County:												
1. County Wide	77,000		17,000	77,000	18,000	59,000	Coast dairy, ltd. trk	80	40	40	225	B.
Jefferson County:												
1. Coast Shoestrings	1,700		some	1,700	100	1,600	Farm livestock, coast dairy	nr	30		3	C.
Pacific County:												
1. Bone River	400		400	400	400		Coast dairy	nr	60		6	B2.
2. Chinook Dr. Dist	1,500		1,500	1,500	1,500		Coast diary, truck	100	nr		15	B2.
3. Diking Dist. No. 1	818		818	818	818		Coast dairy		60	yes	12	B2.
4. Diking Dist. No. 2	1,500		1,500	1,500	1,500		do	100	nr	nr	15	B2.
5. Diking Dist. No. 3	150		150	150	150		Coast dairy, truck	60	nr	nr	5	B2.
6. Diking Dist. No. 4	400		400	400	400		Coast dairy	100	nr		4	B2.
7. Diking Dist. No. 5	2,400		1,200	2,400	2,400		do	100	nr		24	B2.
8. Dr. Dist No. 1	1,900		1,900	1,900	1,900		Cranberries	20	20		95	B2.
9. Dr. Dist. No. 3	700		700	700	700		Coast dairy, cranberry	60	nr	nr		
								20	20		18	B2.
10. Naselle Area	2,500		2,500	2,500	2,500		Coast dairy	nr	60		40	B2.
11. Nemah	1,000		1,000	1,000	1,000		do	nr	60		16	B2.
12. Peninsula	1,500		1,500	1,500	1,500		Coast dairy, cranberry	nr	60			
								20	20		47	B2.
13. South Bend	1,000		1,000	1,000	1,000		Coast dairy	nr	60		16	B2.
14. Whealdon Dik. Dist	350		350	350	350		do	100	nr		4	B2.
Wahkiakum County:												
1. Deep River Area	470		470	470	120	350	Coast dairy	40	40		3	A1.
2. Grays River Area	400		350	400	200	200	do	40	40		5	A1.
3. Skamokawa Cr	200		200	200	200		do	40	40		5	A1.
4. Diking Dist. No. 4	1,750		1,750	1,750	1,750		do	40	40		45	A2.
5. Fern Hills	1,800			1,800	1,800		Coast dairy, berry	nr	60		25	B.
6. Upper Skamokawa	700			700	300	400	Coast dairy	nr	50		6	B.
7. Elokomin	300		300	300	200	100	do	40	40		5	B1.
8. Diking Dist. No. 1	1,650		1,650	1,650		1,650	Coast dairy, specialty	40	40		0	B1.
9. Diking Dist. No. 3	300		300	300	300		Coast dairy	40	40		6	B1.
10. Grays Bay	160		160	160	120	40	do	40	40		3	C2.
11. Hunting Is.	1,500		1,500	1,500	1,500			nr	nr		nr	C2.
OREGON												
Clatsop County:												
1. Diking Dist. No. 13	250		250		250		do	45	45		5	A1.
2. Diking Dist. No. 14	80		80		80		Coast dairy, truck	45	45		2	A1.
3. Clatsop Dr. No. 1	500		500		500		do	35	35		10	A2
4. Diking Dist. No. 7	735		735		400	335	do	35	35		10	A2.
5. I	8,800		600	8,800		8,800	do	40	40		0	B.
6. II	6,831			6,831		6,831	Coast dairy	40	40		0	B.
7. III	225			225	50	175	do	50	40	10	1	B.
8. IV (Clearing)	5,000			5,000	300	4,700	Farm livestock	1,020	60	960	5	B.
(Partial clearing)	(118,000)			*(118,000)	(5,000)	(113,000)	Grazing					
9. V	575			575		575	Coast dairy, truck	40	40		0	B.
10. Warrenton Di. Nos. 1, 2, 3	3,000		3,000		3,000		do	35	35		75	B1.
11. VI. Peat Bottoms	2,900		2,000	2,900	2,900		Berry, truck	35	35		85	B2.
Coos County:												
1. Scattered farming areas	10,000		6,000	10,000	10,000		Coast dairy	50	50	(1)	[2] 200	B.
2. Grazing Dev	(150,000)			*(150,000)	(75,000)	(75,000)	Grazing	640	40	600	100	B.
Curry County:												
1. Gen'l. Area [5]	(34,000)	(3)		*(34,000)			do	640	(1)			B.
1a. Denmark-Lang	2,000		700	2,000	2,000		Coast dairy, farm livestock	(1)	80		25	B2.
1b. Sixes R. Delta	500		50	500	500		do	(1)	80		6	B2.
1c. Elk River	600		60	600	600		do	(1)	80		7	B2.
2. Gen'l. Area [5]	(13,500)			*(13,500)			Grazing	640	(1)			B.
2a. Euchre Cr	80		40	80		80	Coast dairy, farm livestock	(1)	80		0	B2.
2b. Rogue-Hunters	800			800		800	do	(1)	80		0	B.
3. Gen'l. Area [5]	(3,000)			*(3,000)			Grazing	640	(1)		0	B.
4. Gen'l. Area [5]	(9,000)			*(9,000)			do	640	(1)		0	B.
4a. Cheteo	300			300		300	Coast dairy, farm livestock	(1)	80		0	B.
Douglas County (Coast):												
1. Umpqua R. & Tribs	1,270		1,270			1,270	Coast dairy	40	40		0	A2.
Lane County (Coast):												
1 Coastal Valleys	5,000		some	5,000	2,000	3,000	do	nr	60		20	B.
Lincoln County:												
1 Beaver Cr	800		800		800		Coast dairy, truck	60	20	40	30	A2.
2 Salmon R. Delta	2,000		2,000		2,000		do	80	40	40	40	A2.
3 Mill 4 Dr. Dist	700		700		700		Coast dairy	(1)	35	100	20	A2.
4 Adjacent to Mill 4	(2,000)			*(2,000)			Grazing	100	(1)			B.
5 Alsea R	1,000		1,000		1,000		Coast dairy, truck	80	40	40	20	B2.
6 Drift Creek	1,000		1,000		1,000		do	80	40	40	14	B2.
7 Siletz R	1,500		1,500		1,000	500	do	80	40	40	15	B2.
Tillamook County:		(4)										
1 Big Nestucca Dr	200		200		200		Coast dairy	35	30	6	6	A1.
2 Peninsula Dr. Di	105		105		105		do	50	30	20	3	A1.
3 Sunset Dr. Di	151		151		151		do	50	30	20	3	A1.
4 Central	4,000		3,000	1,000	4,000		do	53	30	23	75	B2.
5 Northern	3,900		3,500	400	3,900		do	53	30	23	75	B2.
6 Southern	4,000		1,500	3,000	4,000		do	53	30	23	75	B2.
7 Stillwell, Dr. & Dik	30		30		30		do	50	30	30	1	B2.

*Development for grazing purposes only, through slashing, burning, and seeding. Investigation of such areas should be made to determine their relative suitability for grass or timber production.

s Secondary to drainage development.

( ) Figures in parentheses are not included in totals.

[1] Proposals recognize that development should involve an integrated use of crop and grazing land.

[2] It is estimated that 200 existing farms are submarginal and should be eliminated; thus the net increase of farms for the county would be only 100.

[3] Irrigation, in spite of an actual decline, is thought to be a sound practice and should not be overlooked as a potential land development.

[4] Although no proposals are listed, it is thought that irrigation offers an opportunity for improvement of farms and that individual systems gradually will increase.

[5] Areas suggested for grazing development not mapped.

TABLE 3.—*Cowlitz-Willamette Valleys subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
WASHINGTON												
Clark County:												
1. Scattered over county	20,000	2,000	15,000	20,000	13,000	7,000	Dairy, farm livestock	80–160	40–80	40–80	230	B.
2. Clark Dik. Dist. No. 3 [14]	4,200		4,200		4,200		Dairy	60	40	20	nr	B1.
3. Dik. Dist. No. 8 [14]	1,800		1,800		1,800		do	60	40	20	nr	B1.
4. Salmon Creek	15,000	15,000	some	some		15,000	Dairy, int. gen'l	60	40	20	0	B2.
5. Bachelor's Island	1,800		1,800		1,800		Dairy	40	40		20	C1.
6. Flood Plains [13]	15,000		15,000	some	15,000		Dairy, truck	nr			nr	C2.
Cowlitz County:												
1. Consol. Dik. Di. No. 1	4,000		4,000	2,000	4,000		Dairy, small frt. trk	40	40		100	A1.
2. Dik. Imp. Dist. No. 5	2,000		2,000	1,000	2,000		Dairy	80	40	40	25	A1.
3. Dik. Imp. Dist. No. 11	500		500		500		do	80	40	40	6	A1.
4. Co. wide clearing	23,000		some	23,000	10,000	13,000	Dairy, ltd. gen'l	100	60	40	125	B.
5. Kalama	350		350		160	190	Dairy	40	40		4	C3.
Lewis County:												
1. Co. wide clearing	126,000		some	126,000	80,000	46,000	Dairy, berry	80	40	40	1,000	A.
2. Lowland areas	20,000	20,000				20,000	do	40	40		0	B1.
Skamania County:												
1. Southwest	1,000			1,000	600	400	Farm livestock	80	40	40	8	A.
2. Underwood	3,000			3,000	3,000		do	80	40	40	35	A.
3. South central	700			700	700		do	80	40	40	8	B.
4. Cazadero Tract	2,700	2,700		2,700	1,800	900	do	60	40	20	30	B2.
5. Wind River	6,000	6,000		4,000		6,000	Dairy, tree-fruit, farm livestock	60	40	20	0	B2.
OREGON												
Benton County:												
1. Scattered clearing	15,000			15,000	5,000	10,000	Varied	Varied			50	A.
2. W. Willamette Dr	[3] (1,500)		(1,500)			(1,500)		nr			0	A1.
3. East Long Tom	10,000	10,000	s 5,000			10,000	Int. gen'l. trk, berry	100	80	20	30	B1.
4. West Long Tom	25,000	25,000	s 15,000			25,000	Ltd. gen'l	160–320	80–300	20–240	45	B1.
5. Benton Co. Dr. No. 1	1,720		1,720			1,720		nr			0	B2.
6. Benton Co. Dr. No. 2	1,000		1,000			1,000		nr			0	B2.
7. North Benton Dr	1,000		1,000			1,000		nr			0	B2.
8. R. Flood Control	[1] (6,000)		(6,000)	(6,000)	(6,000)		Truck, berry	80	80		75	B2.
9. Suver Dr.[16]	800		800			800		nr			0	B2.
10. Dixon Cr. Dr	200		200			200		nr			0	C2.
11. Lobster Irr. Prj	600	600				600	Dairy	100	80	20	0	C2.
12. Lower Mary's R. Dr	[3] (500)		(500)			(500)		nr			0	C3.
13. Muddy Cr. Dr	[2] (18,500)		(18,500)			(18,500)		nr			0	C3.
Clackamas County:												
1. Scattered clearing	25,000		some	25,000	5,000	20,000	Ltd. gen'l., farm livestock	160	80	80	60	A.
2. Pasture improvement	[10] (45,000)			•(45,000)	(5,000)	(40,000)	Grazing'			80	0	B.
3. Canby Irr	4,300	4,300	s 3,200	some		4,300	Truck, berry	40	30	10	[4] 50	B1.
4. Eagle Creek	10,000	10,000	s 5,000			10,000	Int. gen'l	80	60	20	30	B1.
5. Molalla Gravity	15,200	15,200	s500			15,200	Truck, berry	80	65	15	30	B1.
6. Molalla Pumping	5,000	5,000	s 5,000			5,000	do	80	60	20	10	B1.
7. Marquam	24,000	24,000	s 7,200	some		24,000	Int. gen'l	80	60	20	100	C2.
8. Kellogg Cr. Dr. Di	800		800			800	Largely suburb					C3.
9. Liberal Dr. Dist	[6] (400)		(400)			(400)	Int. gen'l	80	60	20	0	C3.
Columbia County:												
1. Beaver Dr. Dist	1,500		1,500			1,500	Farm l., dairy, spec	80	60	20	20	A1.
2. Deer Island Dr.	[6] 4,000		4,000			4,000	Dairy, farm livestock	60	40	20	6	A1.
3. Sauvies Is. Dr. Dist	632		632	some	632		Dairy, truck	80	60	20	5	A1.
4. Scappoose Dr. Dist	4,800		4,800	some	2,400	2,400	Dairy, farm livestock	80	60	20	60	A1.
5. Webb Dr. Dist	150		150			150	Dairy	50	40	10	3	A1.
6. Westland Dr. Dist	800		800			800	Dairy, specialty	80	60	20	10	A1.
7. Nehalem R	3,000			3,000	3,000		Farm livestock	200	160	40	15	B.
8. Prescott Dr	1,000		1,000			1,000	Dairy	60	50	20	6	B1.
9. Warren Dr	850		850			850	do	60	50		4	C2.
Lane County:												
1. Scattered clearing	[7] 600			[7] 600	600		Ltd. gen'l. stone frt	100	60	40	6	A.
2. Coburg Calapooya	[18] 120,000	120,000	84,000	some		120,000	Int. gen'l. truck	60	60		200	B1.
3. Cottage Grove	13,000	13,000	5,000			13,000	Int. gen'l	80	60	20	20	B1.
4. East Long Tom	40,000	40,000	30,000	some		40,000	Int. gen'l. truck	60	60		75	B1.
5. Eugene Pumping	27,000	27,000	19,000			27,000	Int. gen'l	60	55	5	50	B1.
6. Pleasant Hill	3,500	3,500	s2,000			3,500	Int. gen'l	80	60	20	6	B1.
7. Springfield	7,000	7,000				7,000	Int. gen't. truck	60	60		15	B1.
8. West Long Tom	25,000	25,000	s 25,000			25,000	Ltd. gen'l	80	60	20	60	B1.
9. Camas Swale	4,800		4,800			4,800	do	80	60	20	0	B2.
10. Amazon Dr	[8] (19,700)		(19,700)			(19,700)					0	C3.
11. Coburg Dr	[8] (9,000)		(9,000)			(9,000)					0	C3.
12. Long Tom Dr	[8] (30,000)		(30,000)			(30,000)					0	C3.
13. Meadow Dr	[8] (9,600)		(9,600)			(9,600)					0	C3.
Linn County:												
1. Muddy Creek Prj	[8] [9] (10,000)	(10,000)				(10,000)	Dairy, farm livestock	160	60	100	(75)	A1.
2. Lyons-Mill City	[10] (40,000)			•(40,000)		(40,000)	Grazing	nr			(25)	B.
3. Willamette R. Dev	137,000	137,000	s 65,000	[11] Some		137,000	Varied	100–240	80–160	40–80	500	B1.
4. Crawfordsville	[8] (3,000)	(3,000)			(3,000)		Int. gen'l	80	60	20	0	B2.
5. River Flood Plain	[8] (3,000)		(3,000)	(3,000)	(3,000)		Truck, berry	80	60	20	30	B2.
6. Beaver Cr. Dr	[8] (1,500)		(1,500)			(1,500)					0	C3.
7. Bell Plain Dr	[8] (3,850)		(3,850)			(3,850)					0	C3.
8. Coburg Dr	[8] (5,000)		(5,000)			(5,000)					0	C3.
9. Courtney Cr. Dr	[8] (5,000)		(5,000)			(5,000)					0	C3.
10. Dever Dr	[8] (200)		(200)			(200)					0	C3.
11. Gray Prairie Dr	[8] (4,200)		(4,200)			(4,200)					0	C3.
12. Harmony Sch. Dr	[8] (4,000)		(4,000)			(4,000)					0	C3.

See footnotes at end of table.

TABLE 3.—*Cowlitz-Willamette Valleys subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new form settlement possibilities*—Continued

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
OREGON—continued												
Linn County—Continued.												
13. Oak Cr. Dr	[8] (3,450)		(3,450)			(3,450)					0	C3.
14. Periwinkle	[8] (2,400)		(2,400)			(2,400)					0	C3.
15. Rowland Dr	[8] (9,000)		(9,000)			(9,000)					0	C3.
16. Scio Dr	[8] (2,400)		(2,400)			(2,400)					0	C3.
17. Spnon Crk. Dr	[8] (16,000)		(16,000)			(16,000)					0	C3.
18. Tallman Dr	[8] (1,470)		(1,470)			(1,470)					0	C3.
19. Wyatt Dr.[17]	[8] (1,820)		(1,820)			(1,820)					0	C3.
Marion County:												
1. Central Marion [18]	1,500			[7] 1,500	400	1,100	Dairy	80	55	25	12	B.
2. Jefferson	10,000	10,000	s 5,000			10,000	Dairy, truck	80	60	20	25	B1.
3. Salem-Woodburn	130,000	130,000	s 100,000			130,000	Truck, berry	90	80	10	150	B1.
4. Stayton	25,000	25,000	s 25,000			25,000	do	70	60	10	50	B1.
5. French Prairie	[8] (15,000)		(15,000)			(15,000)	Ltd. gen'l	120	100	20	0	C2.
6. Mt. Angel	5,000	5,000	s 700			5,000	Dairy, nuts	80	60	20	10	C2.
7. Stayton-Mehama	2,500	2,500	s 2,000			2,500	Truck, berry	60	48	12	12	C2.
8. Ankeny Bottom	[8] (3,500)		(3,500)			(3,500)					0	C3.
9. Turner Dr	[8] (6,000)		(6,000)			(6,000)					0	C3.
Multnomah County:												
1. Sauvies Is	10,000		10,000	Some	10,000		Dairy, truck, berry	80	80		75	A1.
2. Scattered clearing				(11)								
Polk County:												
1. Indep.-Rickreall	25,000	25,000	s 25,000			25,000	Varied	100–200	80–160	20–40	40	B1.
2. Falls City Irr. Prj	2,000	2,000				2,000	Ltd. gen'l				0	B2.
3. American Bottom	480		480			480	do	nr			0	C2.
4. Lincoln Dr	3,260		3,260			3,260	do	150			0	C2.
5. Suver Dr	900		900			900	do	150			0	C2.
6. Crowley Prj	[8] (2,000)		(2,000)			(2,000)					0	C3.
7. Polk Co. Imp. Di	11,000		11,000			11,000	Ltd. gen'l	150	100	50	10	C3.
Washington County:												
1. Clearing	50,000			50,000	20,000	30,000	Dairy	160	40	120	100	B.
2. Gales Cr	4,000	4,000				4,000	do	40	40		20	B1.
3. Scattered Irr	1,000	1,000				1,000	do	40	40		25	B2.
Yamhill County:												
1. Scattered clearing	3,000			3,000		3,000	Dairy, farm l	100	65	35	0	A.
2. Willamina Cr	1,000	1,000				1,000	Dairy, ltd. gen'l	50	40	10	5	A2.
3. Pasture Imp	[10] (20,000)			•(20,000)	(10,000)	(10,000)	Grazing	nr			(12)	B.
4. Dayton pumping	6,000	6,000	s 4,000			6,000	Dairy, truck	80	65	15	20	B1.
5. Yamhill N. Side	12,000	12,000	s 4,000			12,000	Ltd. gen'l	75	65	10	60	B1.
6. Yamhill S. Side	40,000	40,000	s 20,000			40,000	Varied	75	65	10	215	B1.
7. Dayton Prairie Dr	[8] (2,360)		(2,360)			(2,360)	Ltd. gen'l dairy	100	65	35	0	B2.
8. Hopewell Dr	[8] (4,400)		(4,400)			(4,400)	Ltd. gen'l	100	65	35	0	B2.
9. Sm. pump projs	8,000	8,000				8,000	Dairy	80	40	40	27	B2.
10. Wapato Lake Dr	1,000		1,000			1,000		nr			nr	C2.

•Development for grazing purposes only, through slashing, burning, and seeding.
s Secondary to irrigation development.
() Figures in parenthesis indicate proposals which overlap other proposals.

[1] Overlaps acreage included in east and west Long Tom area.

[2] Overlaps acreage included in west Long Tom area. Not included in total.

[3] Overlaps Muddy Cr. and west Long Tom areas. Not included in total.

[4] Difference of opinion exists as to settlement potentialities in this area. Estimates vary from 0 to 100 percent increase.

[5] Overlaps Molalla area.

[6] Deer Island itself, comprising 3,000 acres, is in 1 ownership, is used largely for recreation, and is not likely to be subdivided.

[7] In addition to this figure there likely are 30,000 to 40,000 acres now in farms which are suitable for clearing to expand crop acres of present farms. No definite proposal to this effect has been made however.

[8] Overlaps areas included in other proposals. Not included in totals.

[9] 2,000 acres are in Lane County.

[10] Contemplates integrated use of crop and pasture lands. Not included in totals.

[11] It is recognized that there is opportunity for considerable clearing within established farms to increase crop areas. However, no estimate of the total acres involved is available.

[12] New farms involved in use of this pasture are included under other proposals.

[13] Vancouver to Bachelor's Island.

[14] Development proposed but exact location not known.

[15] Scattered shoestring areas, not shown on map.

[18] Numbered under Polk County.

[17] Not located on map.

[19] A large portion of this area is located in Linn County.

TABLE 4.—*Southern Oregon subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Douglas County:												
1. Umpqua River	2,500		2,500			2,500	Dairy, truck	40	40		0	A2.
2. Grazing areas	[a](50,000)			[a](50,000)			Grazing	1,000			(2)	B.
Jackson County:												
1. Sam's Valley	12,000	12,000		some		12,000	Farm livestock, dairy, truck	80	60	40	50	B2.[1]
Josephine County:												
1. Applegate	16,900	16,900		9,354	10,800	6,100	do	60	30	22	[3] 400	B2.
2. Grants Pass	9,100	9,100		2,000		9,100	do	50	30	20	0	B2.
3. Grave Creek	1,200	1,200		925	1,000	200	do	50	40	10	20	B2.[1]
4. Illinois Valley	9,500	9,500		7,095	5,000	4,500	do	60	40	20	100	B2.
5. Merlin	12,200	12,200		10,726	11,000	1,200	do	80	50	30	200	B2.[1]
6. O'Brien	420	420		315	400	20	do	60	40	20	7	B2.
7. Waldo	800	800		800	800		do	60	40	20	12	B2.
8. Williams	1,800	1,800		900	900	900	do	50	30	20	[4] 90	B2.

[a] Development for grazing purposes only, through slashing, burning, and seeding. Not included in totals.
[1] Now being investigated by the Bureau of Reclamation.
[2] Contemplates an integrated use with present farms and crop land areas.
[3] Soil characteristics indicate that farm sizes should be larger than locally recommended; this would decrease number of new farms.
[4] Development primarily to benefit existing farms will permit subdivision of holidays and thus contribute to new farms. Despite this, estimate of new farms appears optimistic.

TABLE 5.—*Great Basin subregion—County classification of agricultural land-development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm-settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
OREGON												
Harney County:												
1. Harney Valley	30,000	30,000				30,000	Range livestock	nr	135	(2)	70	C1.
2. Silver Creek	16,300	16,300		some	16,300		do	nr	210	(2)	55	C2.
Klamath County:												
1. Klamath Lake, Plevna-Keno area.	5,000	5,000	2,500		2,500	2,500	Farm stock, dairy	nr	160		30	B2.
2. Klamath Prj. Modoc Point Ind. Service.	5,880	5,880	1,830		5,880		Farm stock, dairy, specialty	nr	90		30	B2.
3. Miscl. Pumping	10,000	10,000			10,000		Farm stock, spec., dairy	nr	120		80	B2.
4. Modoc Point Marsh Land (Cal-Ore. Pwr. Co.).	2,500	2,500	2,500		2,500		do	nr	160		17	B2.
5. Upper Klamath Lake	9,000	9,000	9,000		9,000		Farm stock, dairy	nr	320		22	B2.
6. Shasta View Irr. Di.	2,800	2,800			1,360	1,440	Farm stock, dairy, spec	nr	80		35	B2.
7. Ft. Klamath Area Pt. Meadows Dr. Di.	22,000	22,000	some			22,000	Farm stock, dairy	nr	160		100	C2.
8. Klamath Dr. Dist	7,000	7,000				7,000	Farm stock, dairy, spec	500	nr		14	C2.
9. Klamath Marsh Area	[1] 30,000	[1] 30,000	30,000			30,000	Farm livestock	1,000	nr		30	C2.
10. Meadows Dr. Dist	18,000	18,000	18,000		18,000		Farm stock, dairy, spec	nr	320		60	C2.
Lake County:												
1. Goose Lake area	17,000	17,000			3,670	13,330	Range stock, dairy	(2)	100	90	70	B2.
2. Warner Lake area	12,000	12,000				12,000	do	(2)	160		75	C2.
Malheur County:[3]												
1. Jordan Valley	(4)											

[1] Contemplates water spreading over pasture areas only; very extensive use.
[2] Contemplates an integrated use with a considerable amount of adjacent grazing land.
[3] The northern portion of this county containing the greatest development has been segregated from this subregion.
[4] Lack of information concerning this potentiality has prevented showing more detail.

TABLE 6.—*Central Oregon subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Crook County:												
1. Ochocho Project	14,000	14,000			2,500	11,500	General, range livestock	100	100		25	B1.
2. Crooked River	8,800	8,800			3,400	5,400	Range livestock	100	100		34	B1.
3. South Unit, Deschutes	25,000	25,000			25,000		Extensive general	100	100		250	C1.
Deschutes County:												
1. Plainview Project	4,000	4,000			3,500	500	Do	nr	nr	nr	20	C1.
Jefferson County:												
1. North Unit, Deschutes	50,000	50,000			50,000		Dairy, extensive general	80	80		[1] 665	A1.
2. Trout Creek	5,500	5,500				5,500	Range livestock	160	80	(2)	0	C1.

[1] Ultimately may approach 1,000 through subdivision.
[2] In addition to the land in the headquarters unit, summer grazing would be needed for about 80 range cattle.

TABLE 7.—*Blue Mountain subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
OREGON												
Baker County:												
1. Burnt River Irr. Dist	16,800	16,800			1,500	15,300	Range livestock	(1)	100		15	A1.
2. Burnt River (sub. area)	[2] 2,000	2,000			800	1,200	do	(1)	100		8	A2.
3. Area NW. of Baker, Baker Valley Project.	47,000	47,000	Much			47,000	Range livestock, dairy	(1)	100		50	C1.
Grant County:												
1. John Day area	1,000	1,000				1,000	Range livestock	1,000	100	900	0	A1.
2. Cottonwood Creek area	5,000	5,000				5,000	do	1,000	100	900	0	C1.
3. Prairie City area	8,000	8,000				8,000	do	600	80	520	0	C1.
4. Mt. Vernon-John Day area.	5,000	5,000				5,000	do	1,000	100	900	0	C2.
Union County:												
1. Anthony Lake (North Powder).	10,000	10,000	Some			10,000	Range stock, dairy	(1)	125		80	B2.
2. Indian and Clark Creeks	2,500	2,500			2,500		do	(1)	125		20	B2.
3. Medical Springs [7]	1,000	1,000				1,000	do	(1)	125		0	B2.
4. Philipps and Gordon Crks.	3,750	3,750			3,750		do	(1)	125		30	B2.
5. Catherine Creek	[4] (20,000)	(20,000)			(10,000)	(10,000)	do	(1)	125		(160)	(5).
6. Cove-Minam	[4] (5,000)	(5,000)			(2,500)	(2,500)	Range livestock, fruit, dairy	(1)	100		(50)	(5).
7. Grande Ronde	100,000	100,000	40,000		80,000	20,000	Range stock, fruit	(1)	120		800	(3).
8. Sanderson Springs	[4] (750)	(750)				(750)	Range stock, dairy	(1)	125		(6)	(6).
Wallowa County:												
1. County Wide Clearing Dev.	9,000	[6] 9,000		9,000		9,000	Range livestock	(1)	nr		0	B.
Wheeler County:												
1. John Day Riv. (West of Service Cr. Scattered areas).	2,000	2,000			2,000		do	(1)	40		35	C2.

[1] Contemplates integrated use of feed crop land with adjacent range land.
[2] Area 2 lies within area 1 but potentialities are in addition to those shown for area 1.
[3] This area is now under investigation by the Bureau of Reclamation. A preliminary survey of part of this area was completed by the B. R. in 1935.
[4] Overlaps area included by Grande Ronde investigation, therefore not included in totals.
[5] Now under investigation as part of the Grande Ronde area.
[6] The development contemplated here is water spreading only for pasture improvement.
[7] Not located on map.

TABLE 8.—*Middle-Columbia-Palouse subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
OREGON												
Gilliam County:												
1. Arlington	11,000	11,000	----	----	11,000	----	Range livestock, cash grain	[1] 780	80 I	[2] 700	100	C1.
2. Rock Creek area	1,500	1,500	----	----	----	1,500	do	[1] 780	80 I	[2] 700	0	C2.
3. Shutler Flat	4,000	4,000	----	----	4,000	----	do	[1] 780	80 I	[2] 700	30	C3.
Hood River County:												
1. Dee Irr. Dist. Ext	350	350	----	Some	350	----	Divers. fruit, gen'l	60	30	30	6	B2.
2. Glacier Dist. Ext	300	300	----	----	300	----	Diversified fruit	40	40	----	8	B2.
3. Middle Fork Dist. Ext	1,000	1,000	----	Some	1,000	----	do	20	[8] 20	----	40	B2.
Morrow County:												
1. Rhea-Willow Cr	6,000	6,000	----	----	----	6,000	Dairy	nr	80	----	0	B2.
2. West Extension	300	300	----	----	----	300	Dairy, spec	nr	160	----	0	C2.
3. Willow Creek area	[6] (207,000)	(207,000)	----	----	----	----	----	----	----	----	----	C3.
Umatilla County:												
1. Pendleton Proj. 1st	[7] 19,600	19,600	----	----	19,600	----	Range stock, dairy, wheat	[1] 200	80 I	[2] 120	100	B1.[7]
2. Butter Creek area	3,600	3,600	----	----	----	3,600	Range stock, dairy	[1] 160	100	60	20	B2.
3. Cold Springs area	67,000	67,000	----	----	67,000	----	Dairy, spec. wheat	200	100 I	100	200	C1.
4. 5th Unit to Hermiston	900	900	----	----	900	----	Dairy	nr	50	----	18	C2.
5. Hermiston Stanfield Ext	300	300	----	----	200	100	do	nr	nr	----	2	C2.
6. Teel Irr. Dist	15,000	15,000	----	----	15,000	----	do	nr	100	----	70	C3.
Wasco County:												
1. Warm Springs Res	3,000	3,000	----	----	3,000	----	Range stock	nr	60	(4)	50	A1.
2. Badger Imp. Co	1,572	1,572	----	----	----	1,572	Extensive gen'l	400	30	[2] 370	10	A1.
3. Dufur area	1,500	1,500	----	----	----	1,500	do	400	30	[2] 370	10	B2.
4. Rock Creek Imp. Co	1,000	1,000	----	----	----	1,000	do	300	50 I	[2] 250	10	B2.
5. Tygh Val. High Line Co	2,000	2,000	----	----	----	2,000	Range stock, dairy	140	70	[1] 70	8	B2.
6. Wapinitia Imp. Dist	4,000	4,000	----	----	2,000	2,000	Extensive general	400	30	[2] 370	20	(3).
WASHINGTON												
Columbia County:												
1. Touchet River Irr	[5] 5,000	5,000	----	----	----	5,000	Fruit, spec.	nr	nr	----	0	C1.
Klickitat County:												
1. Glenwood area	17,000	17,000	8,000s	10,000s	10,000	7,000	Range stock, dairy	200	80	120	25	B2.
2. Trout Lake	5,000	5,000	----	5,000s	5,000	----	Dairy	160	100	60	20	B2.
3. Roosevelt area	2,000	2,000	----	----	1,500	500	----	nr	100	----	10	C2.
Walla Walla County:												
1. Gardena area	4,000	4,000	----	----	----	4,000	----	nr	----	----	nr	B2.
2. Touchet Extension	1,000	1,000	----	----	1,000	----	General	nr	70	----	10	C1.
3. Wallula-Touchet	6,000	6,000	----	----	6,000	----	do	nr	nr	----	nr	C2.
4. Burbank Irr	10,000	10,000	----	----	10,000	----	Berries, dairy	40	30	10	200	C2.
5. Mill Creek area	(9) No est.		----	----	----	----	----	----	----	----	----	
IDAHO												
Nez Perce County:												
1	10,000	10,000	----	----	10,000	----	----	nr	nr	----	nr	C2.

I Irrigated.
s Secondary to irrigation development.

[1] Livestock operations often involve additional summer grazing lands.

[2] "Other" in this case is largely nonirrigated wheat land.

[3] It is understood that the Bureau of Reclamation is currently making a study of this area.

[4] Probably contemplates an integrated use with adjacent grazing lands.

[5] Represents all lands with well established water rights in both Columbia and Walla Walla Counties.

[6] Superseded by Army's program which removes 180 square miles for development of a bombing field and ammunition dump. Not in totals.

[7] A report unfavorable to development of the project strictly from the standpoint of irrigation was issued by the Bureau of Reclamation in 1935. Subsequent activity by interested groups led to the current flood control survey by the Army Engineers. Not only might the current survey reduce the cost to irrigation by charging part of the construction and mantenance costs to flood control benefits, but also it might radically alter and extend the location of lands proposed for irrigation.

[8] Some recommendations suggest larger farms than are shown.

[9] This rather indefinite proposal would depend on storage on the upper Walla Walla River and Mill Creek.

TABLE 9.—*Central Washington subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	Classification of proposals
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Benton County:												
1. Kennewick Extension	26,000	26,000			26,000		Diversified gen'l	nr	50		500	B1.
2. Priest Rapids Extension	6,000	6,000			6,000		do	70	70		75	B2.
3. Riverland Irr. Dist	2,000	2,000	some		2,000		Fruit, divers. gen'l	80	80		25	B2.
4. Horse Heaven Irr. Di	200,000	200,000			200,000			nr	120		1,500	C3.
5. Roza Project (listed under Yakima County).												
Chelan County:												
1. Leavenworth	800	800			800		Fruit, dairy	nr	40		20	C2.
2. Malaga	1,200	1,200			1,200		do	60	30	30	40	C2.
Douglas County:												
1. Moses Coulee	6,000	6,000			6,000		do	25	25		250	C2.
2. Columbia River bench land, north of Grand Coulee.	1,000	1,000			1,000		Dairy, range stock	nr	40	(1)	25	C2.
Franklin, Grant, Adams Counties:												
1. Columbia Basin Proj	1,200,000	1,200,000			1,200,000		Diversified gen'l	80	80		15,000	A1.
Franklin County:												
2. Pasco Area	1,500	1,500				1,500	Grapes, truck	20	20		0	C1.
Kittitas County:												
1. Ext. of Kittitas Div. Yak. Pr.	13,000	13,000		13,000	6,500	6,500	Dairy, gen'l	80	60	20	80	B2.
2. Virden-Mt. Home	1,000	1,000		1,000		1,000	do	80	60	20	0	B2.
Okanogan County:												
1. Colville Proj. (Ind.[3])	10,000	10,000			10,000		Dairy, livestock	nr	100	(1)	100	B1.
2. Ext. of Monse Proj	5,000	5,000			5,000		General	nr	50		100	B1.
3. Subarea III, W. F. Area Okanogan River.	2,000	2,000			2,000		Dairy, stock, fruit	nr	80		25	B2.
Yakima County:												
1. Roza Project	[2] 72,000	72.000			72,000		Diversified gen'l	80	60		900	A1.
2. Wapato Pumping	4,200	4,200			4,200		General	80	80		50	A1.
3. Klickitat Unit	30,000	30,000			22,000	8,000	do	80	80		275	B1.
4. Satus Unit	7,000	7,000			7,000		do	80	80		85	B1.

[1] Contemplates an integrated use of feed crop land with adjacent grazing lands.
[2] About ⅙ is in Benton County.
[3] This land is in several localities in the reservation, not located on map.

TABLE 10.—*Northeastern Washington-Northern Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	Classification of proposals
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
IDAHO												
Benewah County:												
1. Area III	1,000			1,000		1,000	Dairy, farm livestock	nr	80	(1)	0	B.
2. Area V, VI	1,800			1,800		1,800	do	nr	80	(1)	0	B.
3. Area VII, VIII	1,300			1,300		1,300	do	nr	80	(1)	0	B.
4. Area IX, XI	2,500			2,500	1,000	1,500	do	nr	80	(1)	13	B.
5. Potential Dik. Area, Dr. Dist. #6.	1,500		1,500		1,500		Fruit, dairy	80	80		18	B2.
Bonner County:												
1. Clark Fork Flood Contr. for Pend Oreille Lake.[4]	1,500		1,500			1,500	Dairy		50		0	C3.
2. Clark Fork Basin Dr.[4]	1,250		1,250			1,250						Unclassified.
Boundary County: Drainage Districts.	(3)										(3)	
1. Scattered clearing	9,000			9,000		9,000					0	A.
Clearwater County:												
1. Weippe-Frazier Area	9,600			9,600	9,600		Livestock, dairy	120	80	40	80	B.
2. Grangemont Area	800			800		800	do	120	80	40	0	B.
3. Cavendish Area	3,500			3,500		3,500	do	120	80	40	0	B.
aho County:												
1. (Area 20D)	6,500			6,500	6,500		Livestock, spec. crop	250	100	150	25	B.
2. (Area 4)	250			250	250		do	250	100	150	1	B.
3. (Area 28)	2,000	2,000		2,000		2,000	Dairy	nr	80		0	B2.

See footnote at end of table.

TABLE 10.—*Northeastern Washington-Northern Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*—Continued

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
IDAHO—continued												
Kootenai County:												
1. County Wide	62,000	----------	some	62,000	20,000	42,000	Dairy, general	100 240	60 110	40 130	--------- 200	A.
2. Rathdrum Prairie	40,000	40,000	some	----------	34,000	6,000	Diversified genl	80	80	(²)	400	B1.
Latah County:												
1. Area 12-13	4,000	----------	----------	4,000	4,000	----------	Dairy	120	nr	--------	35	B.
Lewis County:												
1. Winchester Morrow Area Cut-over land.	6,000	----------	----------	6,000	6,000	----------	Dairy, livestock	80	80	20	75	C.
2. Kamiah Area	200	200	----------	----------	200	----------	----------	nr	nr	--------	nr	C1.
WASHINGTON												
Ferry County:												
1. Deadman's Creek	3,240	3,240	----------	3,240	200	3,040	Mixed livestock	120	40	80	5	B2.
2. Indian:												
a. Inchelium	3,780	3,780	----------	440	1,600	2,180	Mixed livestock, grain	160	60	100	25	B2.
b. San Poil Riv	3,640	3,640	----------	40	400	3,240	do	160	60	100	10	B2.
3. Kettle River Area	1,660	1,660	----------	280	760	900	Mixed livestock, dairy	160	60	100	12	B2.
4. Orient Area	1,000	1,000	----------	1,000	400	600	Mixed livestock	120	40	80	10	B2.
5. Sherman Creek	2,000	2,000	----------	2,000	2,000	----------	Limited genl	160	60	100	30	B2.
Lincoln County:												
1. Crab Creek	1,000	1,000	----------	----------	----------	1,000	Grain, livestock	nr	nr	--------	0	C2.
Pend Oreille County:												
1. Skookum Creek Area	2,000	2,000	----------	2,000	----------	2,000	Dairy	180	60	120	0	A2.
2. Scattered Clearing, So. end of County	5,000	----------	----------	5,000	----------	5,000	Dairy, livestock	180	60	120	0	B.
3. Clark Fork River Area	16,000	16,000	----------	16,000	12,000	4,000	do	180	60	120	200	B2.
4. Davis Creek Area	600	600	----------	600	240	360	Dairy	180	60	120	4	B2.
5. Tiger Area	1,000	1,000	----------	1,000	300	700	do	180	60	120	5	B2.
Spokane County:												
1. North Deer Park Area	1,200	----------	----------	1,200	----------	1,200	do	160	80	80	0	B.
2. Newman Lake Area	1,000	----------	----------	1,000	----------	1,000	do	nr	nr	--------	nr	C.
Stavens County:												
1. Chewelah Comm	4,000	----------	----------	4,000	4,000	----------	Farm livestock, dairy	80	80	--------	50	A.
2. Colville Comm	5,000	----------	----------	5,000	2,000	3,000	do	80	80	--------	20	A.
3. Mill Creek and other Valleys	5,000	1,000	----------	5,000	2,000	3,000	Farm livestock	80	80	--------	25	A.
4. Williams Valley	11,000	some	----------	11,000	6,000	5,000	do	160	80	80	70	A.

[1] Probably should include at least an equal amount of woodlot or stump pasture.

[2] Some recommendations suggest an integrated use with cut-over pasture.

[3] It has been estimated that about 205 new farms could be established on the bottom lands of Boundary County through subdivision of present farms. Likely some drainage improvement would be involved but inasmuch as subdivision is the primary requirement, the acreages involved have not been included in the totals.

[4] Not located on map.

TABLE 11.—*Central Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Adams County:												
1. Council area	12,408	12,408	----------	----------	----- ----	12,408	General, fruit	320	120	200	8	B1.
Boise County:												
Custer County:												
1. Challis area ¹	No Est.	----------	----------	----------	----------	----------	Range livestock	--------	--------	--------	----------	B1.
2. West Side Pahsimeroi ¹	No Est.	----------	----------	----------	----------	----------	do	--------	--------	--------	----------	B1.
Lemhi County:												
1. East Side Pahsimeroi ¹	No Est.	----------	----------	----------	----------	----------	do	--------	--------	--------	----------	B1.
Valley County:												
1. Cascade unit	No Est.	----------	----------	----------	----------	Yes	do	--------	--------	--------	----------	B1.

[1] Under investigation by the U. S. Bureau of Reclamation. Not classified.

TABLE 12.—*Southwestern Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Ada County:												
1. Anderson Ranch [1]	271,800	271,800				271,800	General dairy				0	A2.
2. Willow & Dry Creek	30,000	30,000			30,000		do	80	50	30	375	B2.
3. Snake River Irr. Dist	8,000	8,000	1,500			8,000	Range livestock	80	80		0	B2.
4. Mt. Home [2]	400,000	400,000			400,000		General dairy	80	50	30	5,000	C1.
Canyon County:												
1. Black Canyon Gravity [4]	9,500	9,500			9,500		do	80	50	30	110	A1.
2. Black Canyon Pump	19,400	19,400			19,400		do	70	60	10	270	A2.
3. Willow & Dry Creek	19,000	19,000			19,000		do	80	50	30	230	B2.
Elmore County:												
1. Mt. Home (see Ada County).												C1.
Gem County:												
1. Black Canyon Gravity	25,800	25,800			3,800	22,000	do	70	60	10	30	A1.
2. Black Canyon pump [5]	3,850	3,850			3,850		Dairy	70	60	10	30	A2.
3. S. W. Emmett	750		750			750	General dairy	160	80	80	0	B1.
4. Montour Area	2,000	2,000			2,000		do	80	70	20	10	B2.
Owybee County:												
1. Gem New Lands Irr. Dist.	3,162	3,162			3,162		General	50	50		60	A1.
2. Gem Old Lands Irr. Dist.	1,670	1,670			1,670		do	50	50		33	A1.
3. W. Shoshone Ind. Res.[3]	9,000	9,000			9,000		Range livestock	100	80	20	90	A2.
4. Opaline Irr. Dist	1,100	1,100				1,100	Dairy	80	60	20	0	B1.
5. Bruneau Proj	290,000	290,000			290,000		General	100	60	40	2,000	C1.
Payette County:												
1. Black Canyon Gravity	44,000	44,000			14,000	30,000	Dairy	70	60	10	270	A1.
2. Black Canyon Pump	1,750	1,756			1,750		do	70	60		25	A2.
3. Payette Fruitland	5,400	5,400			5,400		Tree fruit	40	40		100	B1.
4. Willow Creek	5,000	5,000				5,000	General	80	60	20	0	B2.
5. Payette Valley [6]	(75,000)	(75,000)				(75,000)					0	u
Washington County:												
1. Mann Creek	4,296	4,296			214	4,082	Farm livestock	300	60	240	6	B1.
2. Cambridge-Brownlee	15,080	15,080			5,792	9,288	do	300	60	240	30	B1.
3. Midvale area	11,262	11,262			7,432	3,830	do	300	60	240	20	B1.
4. Mann community	800	800			800		General	100	60	40	3	B1.
5. Weiser Flats	4,200	4,200			4,200		do	80	70	10	60	B1.
6. Galloway pump	2,973	2,973			1,863	1,110	do	80	70	10	6	B1.
7. Above Galloway pump, east.	871	871			871		do	80	70	10	3	B1.
8. Above Gallowey pump, west.	1,568	1,568			1,568		do	80	70	10	5	B1.
9. Sunnyside and cove	4,796	4,796				4,796	Livestock-dairy	100	90	10	0	B1.
10. Cove area	3,000	3,000			3,000		Farm livestock	100	90	10	15	B2.
11. Sunnyside and Crystal	400	400			400		Fruit	40	40		0	B2.
Malheur County:												
1. Ontario-Nyssa	342	342			342		Dairy	60	60		5	A1.
2. Owybee Irr. Dist	12,358	12,358			12,358		General	50	50		230	A1.
3. Payette Gre. Slope Irr. Dist.	525	525			525		do	50	50		11	A1.
4. Slide Irr. Dist	206	206			206		do	40	40		5	A1.
5. Vale, Ore. Irr. Dist	5,649	5,649			5,649		do	40	40		140	A1.
6. Warm Springs Irr. Dist	2,400	2,400			2,400		do	40	40		40	A1.
7. Bully Crk	7,600	7,600				7,600	Dairy	60	60		30	B1.
8. Brogan Extension to Vale Proj.	3,000	3,000			3,000		do	60	60		50	B1.

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[1] Acreage includes lands to be benefited in Canyon County.

[2] The Mountain Home project lies in both Ada and Elmore Counties. As the acreage in the respective counties is not determined, the approximate total figure is given for Ada County.

[3] Indian Reservation lands are reserved to Indian ownership.

[4] Mapped as part of proposal No. 2, Black Canyon Pump.

[5] Mapped as part of proposal No. 1, Black Canyon Gravity.

[6] These lands lie also in Gem County. The acreage is not included in tabulation totals since there is some question as to whether they will receive supplemental water. If so, it will be from the Cascade Reservoir.

TABLE 13.—*Southeastern Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Bannock County:												
1. Fort Hall project [2]	67,000	67,000			7,000	60,000	General crop—livestock	80	70	10	75	B1.
2. Ross Fork [3]	(3,600)	(3,600)			3,600		Farm livestock	100	60	40	24	B1.
3. Garden Creek	2,000	2,000				2,000	General crop—livestock	80	70	10	0	B1.
4. Portneuf River Canals	25,000	25,000				25,000	General dairy	160	150 I	10	30	B1.
5. Inkom users	3,000	3,000				3,000	do	160	150 I	10	0	B1.
6. Cleveland Res	1,050	1,050				1,050	Farm livestock	160	160		0	B2.
7. Marsh Creek	1,000	1,000				1,000	do	320	100 D 60 I	160	0	B2.
8. Pebble Creek	882	882				882	do	320	100 D 60 I	160	0	B2.
9. Portneuf Valley [7]	10,000	10,000			10,000		do	160	100 I 60 D		107	C1.
10. Rabbit Creek	800	800				800	do	320	100 D 60 I	60	0	C1.
11. Topons Creek	4,300	4,300				4,300	do	320	100 D 60 I	60	0	C1.
Bear Lake County:												
1. Bloomington Creek	3,600	3,600				3,600	do	300	100 D 60 I	140		B1.
2. Georgetown Creek	3,500	3,500				3,500	do	300	100 D 60 I	140		B1.
3. Raymond Creek	1,400	1,400				1,400	do	300	100 D 60 I	140		B1.
4. Liberty Dell	1,300	1,300				1,300	do	300	100 D 60 I	140		B1.
5. Sleights Canyon	7,937	7,937				7,937	do	300	100 D 60 I	140	30	B1.
6. Montpelier Creek	2,833	2,833				2,833	do	300	100 D 60 I	140		B2.
7. Muddy Creek [5]												
8. Nounan Valley	1,000	1,000				1,000	Farm livestock	300	100 D 60 I	140		B2.
9. Thomas Fork Valley [5]												
10. Bern Dam	5,000	5,000				5,000	Farm livestock	300	100 D 60 I	140		B2.
Bingham County:												
1. Snake River Valley Irrig. Dist	25,000	25,000				25,000	Crop specialty	80	70	10	0	B1.
2. Parsons Ditch Co	1,000	1,000				1,000	do	80	70	10	0	B1.
3. Aberdeen Springfield	63,000	63,000				63,000	do	80	70	10	0	B1.
4. Peoples Canal	20,000	20,000				20,000	do	80	70	10	0	B1.
5. Danskin Ditch Co	6,000	6,000				6,000	do	80	70	10	0	B1.
6. New Lava Side Ditch Co	6,000	6,000				6,000	do	80	70	10	0	Bq.
7. Little Indian Proj	4,000	4,000				4,000	do	80	70	10	0	B1.
8. Blackfoot Irr. Co	15,000	15,000				15,000	do	70	70	10	0	B1.
9. Trego Canal Co	1,700	1,700				1,700	do	80	70	10	0	B1.
10. Woodville Canal Co	3,000	3,000				3,000	do	80	70	10	0	B1.
11. Corbett Slough	7,900	7,900				7,900	do	80	70	10	0	B1.
12. Fort Hall-Snake River [3]	(26,000)	(26,000)			26,000		General crop—livestock	80	801		320	C1.
13. Presto Bench	7,000	7,000			7,000		do	80	80I	85		C1.
14. Taber Area	5,000	5,000			5,000		General dairy	80	70I	25		C2.
Blaine County:												
1. Silver Creek	12,200	12,200				12,200	Range livestock	[1] 320	160 I		0	B2.
2. Warm Springs	15,000	15,000				15,000	do	320	160 I		0	B2.
3. Little Wood River Diversion Dam.	14,000	14,000				14,000	do	320	160 I		0	B2.
Bonneville County:												
1. Swan Valley Users	6,000	6,000				6,000	do	[1] 320	100 D 100 I	120	0	B1.
2. Idaho Irr. Dist	35,000	35,000				35,000	Crop specialty	80	70	10	0	B1.
3. Progressive Irr. Dist	33,000	33,000				33,000	do	80	70	10	0	B1.
4. Martin Canal Co	2,000	2,000				2,000	do	80	70	10	0	B1.
5. New Sweden Irr. Dist	26,000	26,000				26,000	do	80	70	10	0	B1.
6. Capitol Hill Canal Co	2,000	2,000				2,000	do	80	70	10	0	B1.
7. Burke Bros	500	500				500	do	80	70	10	0	B1.
8. Utah-Idaho Sugar Co	7,000	7,000				7,000	do	80	70	10	0	B1.
9. Poplar Pump	10,000	10,000			10,000		Crop, livestock	80	70	10	150	B1.
10. Roberts area	12,000	12,000			12,000		Dairy	80	70	10	150	C1.
Butte County:												
1. Big Lost River	30,000	30,000				30,000	Range livestock	[1] 320	160 I		0	B1.
Camas County												
Clark County:												
1. Medicine Lodge	6,000	6,000				6,000	Range livestock	[1] 320	160	160	0	B1.
2. Camas Creek-Frazier	2,000	2,000				2,000	do	[1] 320	160	160	0	B2.
Caribou County:												
1. Soda Flats	1,000	1,000				1,000	do	[1] 640	180 D 80 I	380	0	B2.
Cassia County:												
1. Cassia Creek	3,000	3,000				3,000	Farm livestock	100	40 I		0	A1.
2. Milner Low Lift Irr. Dist.	10,000	10,000				10,000	Crop specialty				0	B1.
3. Burley Irr. Dist	54,000	54,000				54,000	do				0	B1.
4. South Minidoka	23,000	23,000			23,000		do	80	80 I		287	B1.
5. Raft River	18,100	18,100				18,100	Farm livestock	160	80 I		60	C1.
6. S. Side Minidoka	7,000	7,000			7,000		Crop specialty	80	80 I		80	C1.
7. West Burley	6,000	6,000			6,000		do	80	80 I		70	C1.

See footnotes at end of table.

TABLE 13.—*Southeastern Idaho subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*—Continued

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Franklin County:												
1. Preston Area	1,500	1,500			1,500		Crop Specialty	80	80 I		15	B1.
2. Cub River	5,000	5,000				5,000	Dairy	80	80 I		0	B1.
3. Weston Creek	2,234	2,234				2,234	do	80	80 I		0	B1.
4. Maple Creek	No est.						do	80	80 I		nr	C1.
Fremont County:												
1. Fremont Madison Dist	100,000	100,000				100,000	General crop—livestock	120	105 I	15	0	B1.
2. Squirrel Conant Creek	12,000	12,000			10,000	2,000	Farm livestock	120	105 I	15	100	B2.
Gooding County:												
1. Clover Creek	2,000	2.000				2,000	do	160	80D 80 I		0	B2.
2. North Side Unit	28,000	28,000			28,000		General crop—livestock	80	70 I	10	300	C1.
Jefferson County:												
1. Rigby Canal	4,000	4,000				4,000	Crop specialty	80	80 I		0	B1.
2. No. Rigby Canal Co	1,500	1,500				1.500	do	80	80 I		0	B1.
3. Island Irr. Co	3.500	3,500				3,500	do	80	80 I		0	B1.
4. Matteson Craig Canal Co.	700	700				700	do	80	80 I		0	B1.
5. Farmers Friend Irr. Co	10,500	10,500				10,500	do	80	80 I		0	B1.
6. Parks & Lewisville	6,500	6,500				6,500	do	80	80 I		0	B1.
7. Mud Lake Owsley Canal Co.	20,000	20,000				20,000	do	80	80 I		0	B1.
8. Kite & Nord Canal	200	200				200	do				0	B1.
9. Lowder Slough Canal	1,200	1,200				1,200	do	80	70	10	0	B1.
10. Water Dist. 66	20,000	20,000				20,000	do	80	70	10	0	B1.
11. Bear Island Canal	100	100				100	do	80	70	10	0	B1.
12. Burgess Canal	23,000	23,000				23,000	do	80	70	10	0	B1.
13. Harrison Canal	[8] 16,000	16,000				16,000	do	80	70	10	0	B1.
14. Rudy Canal Co	5,500	5,500				5,500	do	80	70	10	0	B1.
15. Dilts Irr. Co	700	700				700	do	80	70	10	0	B1.
16. Butte & Market Lake	18,000	18,000				18,000	do	80	70	10	0	B1.
17. Enterprise Canal Co	5,000	5,000				5,000	do	80	70	10	0	B1.
18. Clark & Edwards	1,900	1,900				1,900	do	80	70	10	0	B1.
19. McKay Canal	200	200				200	do	80	70	10	0	B1.
20. Reid Canal	5,000	5,000				5,000	do				0	B1.
21. Mud Lake	10,000	10,000			10,000		Range livestock	[1] 160	60	100	60	B2.
22. Birch Creek	5.000	5.000			5,000		do	[1] 160	60	100	30	C1.
23. Roberts Area	10,000	10.000			10,000		General crop—livestock	80	80		125	C1.
24. Dubois Area [6]	95,000	95,000			95,000		Range livestock					C3.
Jerome County:												
1. Snake River Slope	17,000	17,000			17,000		General crop—livestock	100	80 I	20	170	A2.
2. North Side Main Canal	170,000	170,000				170,000	Crop specialty				0	B1.
Lincoln County:												
1. Gooding Div	1,608	1,608			1,608		General crop—livestock	80 I	40 I	40	22	A1.
Madison County:												
1. Lenroot Canal Co	3,800	3,800				3,800	Crop specialty	100	70	30	30	B1.
2. Arnsberger Canal	200	200				200	do	100	70	30	0	B1.
3. Liberty Park Irr. Co	4,300	4,300				4,300	do	100	70	30	0	B1.
4. Sunnydell Irr. Co	3,600	3,600				3,600	do	100	70	30	0	B1.
5. Moody Creek	4,500	4,500				4,500	Range livestock	[1] 320	160	160	0	B2.
6. Canyon Creek	5,000	5,000				5,000	do	[1] 320	160	160	0	B2.
Minidoka County:												
1. North Side Pumping Ex	115,000	115,000			115,000		General crop—livestock	80	70	10	1,500	B1.
2. Minidoka Irr. Dist	65,000	65,000				65,000	do	80	70	10	0	B1.
Oneida County:												
1. Big Malad	6,000	6,000				6,000	do	160	40 D 40 I	80	0	B2.
2. Devil Creek	8,000	8,000				8,000	do	160	40 D 40 I	80	0	B2.
3. Lower Deep Creek	2,000	2,000				2,000	do	160	40 D 40 I	80	0	B2.
4. Upper Deep Creek	2,000	2,000				2,000	do	160	40 D 40 I	80	0	B2.
Power County:												
1. Rockland Canals	2,000	2,000				2.000	do	100	80		0	B1.
2. Power Irr. Dist	30,000	30,000			30,000		do	100	80	20	180	B1.
3. Bannock Creek Area	5.000	5,000				5,000	General livestock	180	20 I	160D	0	B2.
4. Rock Creek	4,000	4,000				4,000	General crop—livestock	100	80 I	20	0	B2.
5. Michaud Unit	30.000	30,000			30,000		do	100	100 I		180	B2.
6. Neeley Project	4.000	4,000				4,000	do	100	80 I	20	0	C1.
Teton County:												
1. Darby Creek	3,900	3,900				3,900	do	80	40 D 40 I		0	B1.
2. Pack Saddle Creek	2,215	2,215				2,215	Farm livestock	320	80 D 80 I	160	0	B2.
Twin Falls County:												
1. Murtaugh Irrg. Dist	10,000	10,000			5,000	5,000	General crop—livestock	80	80 I		60	B1.
2. Rock Creek [4]	(5,000)	(5,000)			(5,000)		do	80	80 I			B1.
3. Bruneau Proj	80,000	80.000			80,000		do	80	80 I		1,000	C1.

I Irrigated.

D Dry.

[1] Feed base. Integrated use of adjacent range expected.

[2] Indian reservation lands are reserved to Indian ownership.

[3] Part of Fort Hall project. Figures not included in summary tabulation.

[4] Part of Murtaugh irrigation district figures not included in summary tabulation.

[5] Estimates of acreage not available.

[6] Estimate of number of farms not made because of proposal classification.

[7] Estimates of acres involved vary from 10,000 to 50,000.

[8] Subsequent information indicates that the acreage under this canal should be reduced to 12,000 acres.

TABLE 14.—*Northwestern Montana subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Flathead County:												
1. Talley Lake Proj	10,000	10,000				10,000	Dairy	120	80 I	40 D	35	A2.
2. Hungary Horse-Flathead Lake Proj.	51,000	51,000		12,000		51,000	General crop—livestock	100	80 I	20 D	125	C1.
3. Flathead Proj. No. 2[1]	(5,000)	(5,000)				(5,000)	do	100	80 I	20 D	(12)	C1.
4. Lupfer Irr	5,000	5,000				5,000	do	100	80 I	20 D	0	C2.
5. Lost Lake	1,000	1,000				1,000	do	100	80 I	20 D	0	C2.
Lake County:												
1. Flathead Proj	33,150	33,150				33,150	do	80I	40	40	300	C1.
2. Scattered clearing	5,000			5,000	5,000		Self-sufficing	20	5		200	C.
Lincoln County:												
1. Twin Lakes Proj	1,000	1,000				1,000	General crop—livestock	80	30	50	0	C2.
Missoula County:[2]												
1. Clinton Bonita 2. Orchard Home 3. Hellgate 4. Frenchtown	20,000	20,000				20,000	do	40	28	12	40	A1.
5. Potomac 6. Grant Rattlesnake 7. 9 Mile Crk-Butler	20,000	20,000				20,000	do	80	38	42	20	B2.
8. Missoula Valley 9. Big Flat 10. De Smet 11. Missoula 12. Grant Crk 13. Lolo Carlton 14. Turah	17,000	17,000				17,000	do	80			30	B2.
Ravalli County:												
1. Bitterroot Dist	25,067	25,067				25,067	do	80	60 I	20	10	B2.
2. Bear Crk	2,500	2,500				2,500	Dairy	80	60 I	20	11	B1.
3. Big Crk Lake	1,500	1,500			1,500		General crop—livestock	100	60 I	40	15	B1.
4. Blodgett Crk	5,000	5,000				5,000	Dairy	80	60 I	20	18	B1.
5. Burnt Crk	8,000	8,000				8,000	General crop—livestock	80	60	20	0	B1.
6. Tin Cup	2,000	2,000				2,000	Fruit	40	40 I		0	B1.
7. Camas Crk	1,000	1,000				1,000	General crop—livestock	80	60 I	20	0	B1.
8. Conner Proj	1,600	1,600				1,600	do	40	40 I		0	B1.
9. Florence	6,500	6,500				6,500	do	80	60 I	20	10	B1.
10. F. Burr. Crk	5,000	5,000				5,000	do	80	60 I	20	0	B1.
11. Lower Canyon	1,200	1,200				1,200	Fruit	40	40 I		0	B1.
12. Sunset Irrig. Dist	2,859	2,859				2,859	Dairy	40	40 I		0	B1.
Sanders County:												
1. Green Mountain	1,800	800		1,680		1,800	General crop—livestock	80	50 I	30 D	0	A1.
2. Trout Crk	5,000	5,000		2,000		5,000	do	80	60 I	20 D	10	B2.
3. Noxon-Heron—Pilgrim-Elk Crk.	10,000	10,000		5,000		10,000	do	80	60 I	20 D	30	B2.
4. Big L Beaver White Pine	18,000	18,000		9,000	9,000	9,000	do	80	60 I	20 D	100	B2.
5. Clarks Fk. & S. Side Unit	160	160				160	do	80	60 I	20 D	0	B2.

I Irrigated.
D Dry.

[1] Portion of Flathead project, acreage not included in summary table.

[2] Individual proposals for Missoula County have been presented as groups of proposals which would benefit similar types and sizes of farms.

TABLE 15.—*Southwestern Montana subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Beaverhead County:												
1. Big Sheep Creek Stor	4,340	4,340				4,340	Range livestock	[1] 320	100 I 100 D	220+	9	A2.
2. Clark Lake Stor	4,500	4,500				4,500	do	[1] 320	100 I 100 D	120	0	A2.
3. East Bench Irr. Dist	18,450	18,450			8,000	10,450	do	[1] 320	100 I 100 D	120	20	A2.
4. Medicine Lodge	2,400	2,400				2,400	do	[1] 320	100 I 100 D	120	0	A2.
5. Madison-Beaverhead [2]	70,000	70,000				70,000	do	[1] 320	100 I 100 D	120	0	C1.
6. Kelly Res	1,500	1,500			750	750	do	[1] 320	100 I	120	0	C2.
7. Tent Crk. Group	500	500				500	do	[1] 320	100 I	120	0	C2.
8. Willow Crk. Res	290	290				290	do	[1] 320			0	C2.
9. Red Rock River area	57,000	57,000				57,000	do	[1] 640	160 D 160 I	320	0	C2.
10. Blacktail Creek	8,000	8,000				8,000	do	[1] 320	160 D 160 I		0	C2.
11. Big Hole Basin	25,000	25,000				25,000	do	[1] 640	160 D 160 I	320	0	C2.
12. Grasshopper and Horse Creek Valleys.	5,000	5,000				5,000	do	[1] 640	160 D 160 I	320	0	C2.
Jefferson County:												
1. Whitetail Irrig	4,000	4,000			2,000	2,000	General crop, livestock	120+	120 I		13	A1.
2. Jefferson River Div	11,000	11,000				11,000	Dairy	120I	120 I		7	B1.
3. Upper Boulder	6,600	6,600				6,600	General crop, livestock	120+	120 I		0	B1.
4. Pipestone Bench	2,500	2,500				2,500	do	120+I	120 I		0	B1.
5. Elk Park	4,000	4,000			4,000		Dairy	160I	160 I		10	B2.
6. Pleasant Valley [3]	3,494		3,494			3,494	do	120+	120 I		0	C1.
Lewis & Clark County:												
1. Smith Crk. Proj	10,000	10,000			6,500	3,500	Range livestock	[1] 320	160 I		10	B1.
2. Dearborn-Crown Butte	20,000	20,000			20,000		General crop, livestock	[1] 120	120 I		165	B2.
3. Helena District	7,100	7,100			7,100		do	120	100 I		50	B2.
4. Milan Res	10,000	10,000				10,000	Range livestock	[1] 320	160 I		20	B2.
5. Wolf Crk	2,600	2,600				2,600	do	[1] 120	120 I		0	B2.
6. Silver Irrig. Co	14,760	14,760			7,750	7,010	do	[1] 320	160 I	160	10	C1.
7. Ten Mile Crk	2,000	2,000				2,000		[1] 320	160 I		0	C1.
8. Prickly Pear Proj	1,800	1,800				1,800	Range livestock	[1] 320	160 I	160	0	C2.
Powell County:												
1. Little Blackfoot—Cottonwood.	3,000	3,000				3,000	do	[1] 320	160 I	160	5	B1.
2. Race Track Proj	6,000	6,000				6,000	General crop, livestock	[1] 320	160 I	160	10	B1.
3. Chimney-Douglas Crk	7,000	7,000			7,000		Ranga livestock	[1] 320	200	120	10	C1.
4. Klein-Schmidt Flat	8,000	8,000			8,000		do	[1] 320	160 I	160	15	C2.
5. Lensing	3,000	3,000				3,000	do	[1] 320	160 I	160	0	C2.
6. Demsey Crk	2,500	2,500				2,500	General crop, livestock	[1] 320	160 I	160	0	C2.
7. Coopers Lake District	12,000	12,000			12,000		Range livestock	[1] 320	160 I	160		C3.
Silver Bow:												
1. Brown's Gulch Area	3,500	3,500			3,500		Truck	200	20 I		150	B1.

I Irrigated.
D dry.

[1] Feed-base unit, grazing rights needed in addition.

[2] Proposal involves diversion of Madison headwater stream into Beaverhead drainage. The additional water would benefit lands both in and outside Beaverhead County.

[3] Shown on subregional map of irrigation proposals as the area is now subirrigated.

TABLE 16.—*Southcentral Montana subregion—County classification of agricultural land development proposals by acreage, type, and purpose of development and probable type, size, and number of new farm settlement possibilities*

Proposals by counties	Acres proposed for development						New farm potentialities consequent to development					Classification of proposals
	Total acres involved	Type of development			Purpose of development		Type of farm suggested	Recommended average size (acres)			Approximate number of new farms	
		Irrigation	Drainage	Clearing	Primarily for new farms	Primarily to benefit existing farms		Total	Crop	Other		
Broadwater County:												
1. Broadwater-Missouri	21,000	21,000			10,500	10,500	General crop, livestock	160	80	80	50	A1.
2. Crow Creek Project	83,000	83,000			68,000	15,000	do	160	80	80	425	B1.
3. Crow Creek Dist.[1]	(40,000)	(40,000)			(22,000)	(18,000)	do	160	80	80	(140)	B1.
4. Crow Creek Ditch [1]	(18,000)	(18,000)				(18,000)	do	160	80	80	0	B1.
5. Valley View District	2,695	2,695			2,695		do	160	80	80	15	B1.
Gallatin County:												
1. Middle Creek area	15,000	15,000				15,000	do	320	120 I 150 D	50	0	A1.
2. West Gallatin	97,000	97,000				97,000	do	320	150 D 150 I	20	0	A2.
3. South Bench District	7,500	7,500			7,500		do	320	150 D 150 I	20	25	B1.
4. Jefferson Pumping	7,500	7,500				7,500	do	320	320 I		0	B1.
5. East Gallatin area	24,000	24,000				24,000	do	320	150 D 120 I	50	0	B1.
6. West Gallatin area	20,000	20,000			20,000		do	320	150 D 120 I	50	40	B1.
Madison County:												
1. Ruby River East Side	11,650	11,650			1,150	10,500	Range livestock	320	200 D 100 I	20	10	A2.
2. Ruby River Ditch	13,922	13,922			6,100	7,822	do	320	100 D 160 I	60	50	A2.
3. So. Boulder	4,462	4,462			2,355	2,107	General crop, livestock	320	160 D 160 I	60	0	B1.
4. Beaverhead Rock [5]	68,000	68,000				68,000	Farm livestock	320	160 D 160 I	60 D	0	B1.
5. Ruby Crk. Proj	2,000	2,000			2,000		Range livestock	[4] 640	160 I 160 D	320	0	B2.
6. Norwegian Crk	300	300				300	do	[4] 640	160 I 160 D	320	0	B2.
7. East Madison Bench	[8] 170,000	170,000			140,000	30,000	do	[4] 640	160 D 160 I	320	100	C1.
8. Eight Mile Bench	7,000	7,000			6,500	500	do	[4] 640	160 I 160 D	320	10	C1.
9. Ruby Carey Act. Proj	40,000	40,000			40,000		do	[4] 640	160 I 160 D	320	50	C1.
10. Madison Cherry	1,000	1,000			500	500	do	[4] 640	160 I 160 D	320	2	C2.
11. Madison River No. 2 [2]	(30,000)	(30,000)			(30,000)		do	[4] 640	160 D 160 I	320	(45)	C3.
12. Bell Lake Summit [6]	2,000	2,000			2,000		do	[4] 640	160 I 160	320	0	C3.
Park County:												
1. Rosedale Elbow	2,200	2,200				2,200	Farm, livestock	80	80 I		5	B1.
2. Shields River	25,000	25,000			4,000	21,000	Range livestock	[4] 535	160 D 130 I	245	30	B2.
3. D'Ewart Res	100	100				100	do	[4] 535	160 D 130 I	245	0	B2.
4. Lat Dam	15,000	15,000			3,000	12,000	do	[4] 535	160 D 130 I	245	20	B2.
5. Muddy Res	100	100				100	do	[4] 535	160 D 130 I	245	1	B2.
6. Wilsall Dam	6,500	6,500			6,500		do	[4] 535	160 D 130 I	245	50	B2.
7. Small Wilsall Dam [3]	(450)	(450)			(450)		do	[4] 535	160 D 130 I	245	(3)	B2.
8. Antelope Res	8,700	8,700			8,000	700	Crop livestock	[4] 320	130 I	245	30	B2.
9. Elk Crk	150	150				150	Farm livestock	290	130 I	160	1	B2.
10. Porcupine Crk	200	200				200	do	290	130 I	160	3	B2.
11. Potter Basin Res	25,000	25,000			25,000		do	290	130 I	160	50	B2.
12. Mill Creek	4,000	4,000				4,000	General crop, livestock	80	80 I		12	B2.
13. Brackett Crk. 1	9,791	9,791			9,791		Crop livestock	220	110 I	110 D	0	C1.
14. Brackett Crk. 2	5,550	5,550			5,550		do	220	110 I	110 D	0	C1.
15. Cottonwood Crk	360	360				360	Farm livestock	220	110 I	110 D	0	C2.
16. Rock Crk. Stor	300	300				300	Range livestock	[4] 535	160 D 130 I	245	0	C2.
17. Mission Ranch	1,500	1,500			1,500		do	[4] 400	120 I	280	12	C2.
18. Eight Mile Proj	500	500				500	Farm livestock	290	130 I	160	0	C2.
19. Spring Creek	688	688				688	General crop, livestock	125	60 I	65	10	C2.
20. Rock Crk. Bench Area	10,000	10,000			10,000		Farm livestock	320	100	220	20	C2.
Meagher County:												
1. Dorsey Storage Proj	3,000	3,000			3,000		Farm livestock	320	100 I	220 D	30	B2.
2. S. Fk. Storage [7]	(3,000)	(3,000)			(3,000)		do	320	100 I	220 D	(30)	B2.
3. Newland Sheep Crk	5,000	5,000			5,000		do	320	100 I	220 D	15	B2.
4. Woods Gulch Irr. Proj	800	800				800	do	320	100 I	220	0	B2.

I Irrigated.
D dry.

[1] Portion of Crow Creek project, these figures do not appear in the summary tables.
[2] Portion of east Madison bench, these figures do not appear in the summary tables.
[3] Portion of Wilsall Dam project, figures do not appear in the summary tables.
[4] Feed base integrated with adjacent range.
[5] Storage reservoir for lands particularly below Crow Creek and Broadwater.
[6] Superseded by Willow Creek storage.
[7] Included in Dorsey storage project.
[8] This area as mapped was based on earlier proposals which contemplated a somewhat lesser acreage.

PART III
INDUSTRIAL DEVELOPMENT

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The body of the following report was prepared in 1941 by the staff of the Regional Planning Commission. The study was under the immediate direction of and the report was drafted by Blair Stewart, Consultant. Dr. Stewart was assisted by James E. Maxwell, Associate Economist.

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[1] Until July 1941.

PART III
FOREWORD

The relative immaturity of the economy of the Pacific Northwest—with its emphasis on the extraction of farm, forest, and mineral materials and its deficiency in manufacturing activity—has been emphasized in many economic studies of the region. A broadening of processing and manufacturing industries has been considered as a major regional need, and one of the fundamental means of providing economic opportunity for persons migrating to the region. It would be a prime factor in providing for a better utilization of material, labor, and technical resources, supplying an essential offset to diminishing activity due to resource depletion in certain areas and would, therefore, be a means of improving and stabilizing employment, income, and living standards. The expansion and broadening of industrial activity are also large factors in the use of regional resources for national defense, as well as in their later use in post-emergency readjustment and progress.

In building for enlarged economic opportunity for a greater regional population, through more stable employment and higher living standards, it is apparent that the region's economic base must be broadened and strengthened. The structure of employment in the Pacific Northwest rests largely on two basic supports—those of agriculture and forestry. These two supports lack stability. The major forest product, lumber, is a durable good and excessively sensitive to changes in business conditions. Agriculture is subject to weather hazards and to severe price fluctuations, which result in great variations in the income of the agricultural population. The superstructure of service employment suffers from the instability of its supports. Greater stability can be attained, and added economic opportunities provided, only if the forest and agricultural supports can be strengthened and their permanence insured, and new basic activities added.[1]

Production and employment in the forest industries in their present forms give little promise of net expansion. Indeed, unless there is accelerated progress in waste elimination and in the development of activities based upon the forest resource, but providing greater and more stable employment, there may be a significant regional decline (as well as severe subarea depressions) in this field a decade or two hence.[2]

The survey of potential economic opportunity through land development,[3] which is a companion study to this of industrial development, shows immediate prospects in the Pacific Northwest for the development of approximately 2.3 million acres of agricultural land through irrigation, clearing, or drainage. About one-third of this will be developed primarily to benefit existing farms, and thus increase the security of farm income. The remainder will be available for about 21,000 new farms. A large proportion of these farms will be irrigated, and therefore less subject to weather hazards than nonirrigated land. The result should be a broader and somewhat more stable agricultural base.

With respect to Pacific Northwest industrial development, the ensuing report reviews, in condensed narrative and statistics, the historical trends, the present situation, and the future prospects.

The economic development of the Pacific Northwest has advanced in fairly well-marked stages. Exploitation of a natural resource featured each stage. The limit of expansion based on some of these resources has been reached and passed; for others, it may not be far ahead.

After forests, the most distinctive natural resource of the Pacific Northwest—its hydroelectric power, 12 percent of the national total installed capacity in 1939 and 40 percent of the potential capacity of the country—is just now beginning to make a deep impress on the regional development and economy. The situation with respect to this power and to industry in the Pacific Northwest is unique. Good power sites are found on many streams and in the Columbia River and its tributaries is one of the greatest sources of energy in the world. Because of the magnitude, low cost, and concentration of this energy within a well-defined region, it is peculiarly suited to use by electrochemical and the electrometallurgical industries—activities that are becoming more and more important as the needs for light metals, alloys, and heavy chemicals increase.

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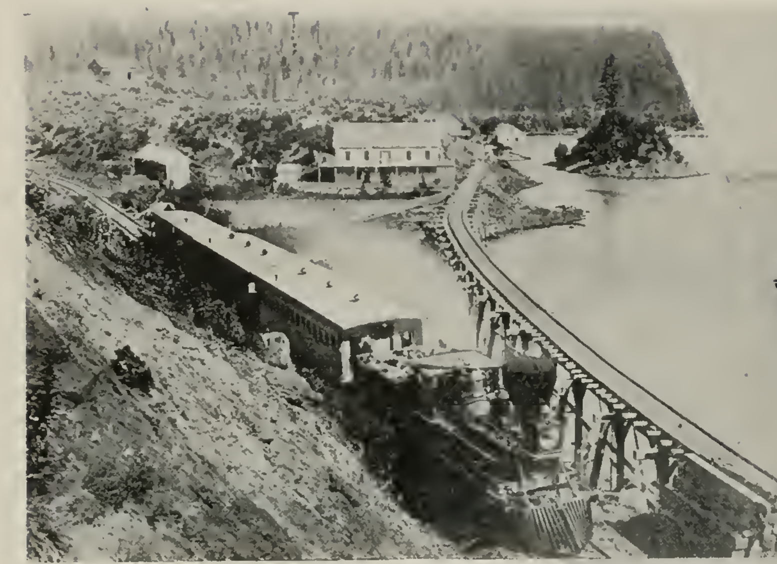
[1] *Migration and the Development of Economic Opportunity in the Pacific Northwest,* Pacific Northwest Regional Planning Commission, 1939; also Part I of this report.

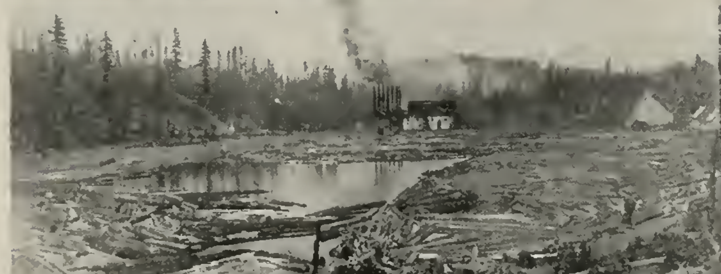
[2] *Forest Resources of the Pacific Northwest,* Pacific Northwest Regional Planning Commission, National Resources Committee, 1938; also discussion hereinafter.

[3] See part II of this report.



Portage railway at Cascade Locks on the Columbia River (*above*).

Ferrying trains across the Snake River (*top*).
Logging crew in the Northwest before the high-lead (*left*).
Horse seining near the mouth of the Columbia River (*above*).
A typical Oregon sawmill of the 1900's (*below, left*).
Effects of logging and fire in 1902 (*below, right*).



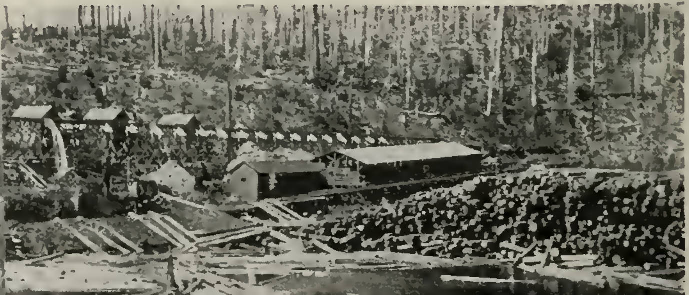


Figure 33. Early Industry of the Pacific Northwest.

PART III

1. RECENT DEVELOPMENT

Industrially, the Pacific Northwest has developed by emphasizing in succession the exploitation of the various natural resources of the region. In each case the exploitation has eventually been carried to the point where opportunities for further general expansion in the utilization of the resource are greatly limited. This is apparent from a study of the data presented in Figure 34. It may be seen that the rate of growth of the populations directly dependent on each of the resources was more retarded between 1910 and 1930 than in earlier periods. Although complete census data are not available for 1940, it can be asserted confidently that this condition has continued to the present time.

The method of plotting used in Figure 34, by which the numbers gainfully employed are shown on a logarithmic scale, may give the false impression that the actual numbers employed in the different activities did not increase appreciably in the last two decades shown. There were important increases—and the question of the continuance of growth on comparable scale can be answered only by appraising the condition of the different resources and the extent of the drain being placed upon them.

Fisheries

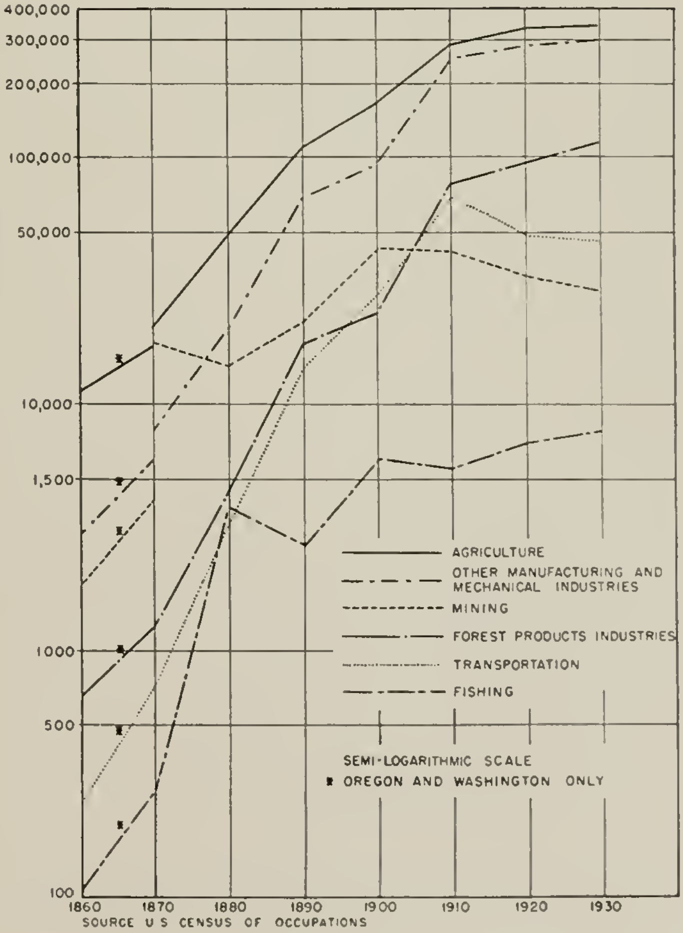
The salmon fisheries are being exploited to the limit of their present capacity, if not beyond. The history of the salmon packing industry is summarized in Table 1. The decade of peak production was from 1910 to 1919. The output between 1930 and 1939 was only slightly greater than from 1890 to 1899.

Present conservation methods are not adequate to assure the continuation of even this reduced output. A more effective program should be developed. One step which has been taken has been the creation of the International Salmon Fisheries Commission by treaty between Canada and the United States. This commission has been making investigations of the Puget Sound-Fraser River salmon fisheries, but has been greatly handicapped by insufficient funds. The salmon resource will continue in a highly unsatisfactory condition—making a contribution to the economy of the region far below the level it could achieve—until funds have been made available for adequate investigations, and until the control methods developed by such investigations have been put into effect.

A less important but significant activity is the North Pacific halibut fishery. Overfishing threatened this resource with complete extinction, but under a treaty between the United States and Canada, the International Fisheries Commission was created in 1924 to make investigations of this fishery. In 1931, the Commission was given regulatory powers through a new treaty. The studies and control methods adopted give promise of preservation, and even increase, in this valuable resource.

An interesting example of a resource almost completely destroyed by too rapid exploitation is found in the sturgeon of the Columbia River. Commercial

GAINFULLY EMPLOYED WORKERS
BASIC INDUSTRIAL CLASSIFICATIONS
PACIFIC NORTHWEST
1860-1930



SOURCE U S CENSUS OF OCCUPATIONS

FIGURE 34

fishing for sturgeon was particularly active in the 1890's, the catch in 1892 amounting to 5,467,000 pounds. Rapid depletion occurred, and the annual catch is now insignificant.[12]

Table 1.—*Pacific Northwest salmon pack, 1870–1939*

Period:	*Pack, million cases*
1870–1879	3.4
1880–1889	5.6
1890–1899	8.1
1900–1909	12.1
1910–1919	18.6
1920–1929	11.0
1930–1939	8.6

Source: Cobb, *Pacific Salmon Fisheries*, U. S. Department of Commerce, Bureau of Fisheries, Fisheries Document No. 1092, and *Pacific Fisherman*, Yearbooks.

In recent years, there has been some development in pilchard and tuna fishing, but it seems unlikely that these activities will approach the importance of salmon fishing. In general, it appears that no great increase in the importance of fishing in the economy of the region is likely. In any event, far reaching changes in the economy cannot be expected as a result of new developments in fishing. Less than one percent of the gainfully employed in the region are directly engaged in fishing. Many more, of course, are employed in processing and handling fish products, and some communities are largely dependent upon such activities. Relatively large and unfavorable changes in fishing would be most undesirable and would seriously affect many individuals, but the major characteristics of economic life would not be greatly changed.

Mining

The value of mineral production in the Pacific Northwest since 1910 is shown table 2 and figure 35. The

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[12] Joseph A. Craig and Robert L. Hacker, *op. cit.*, pp. 204–205.

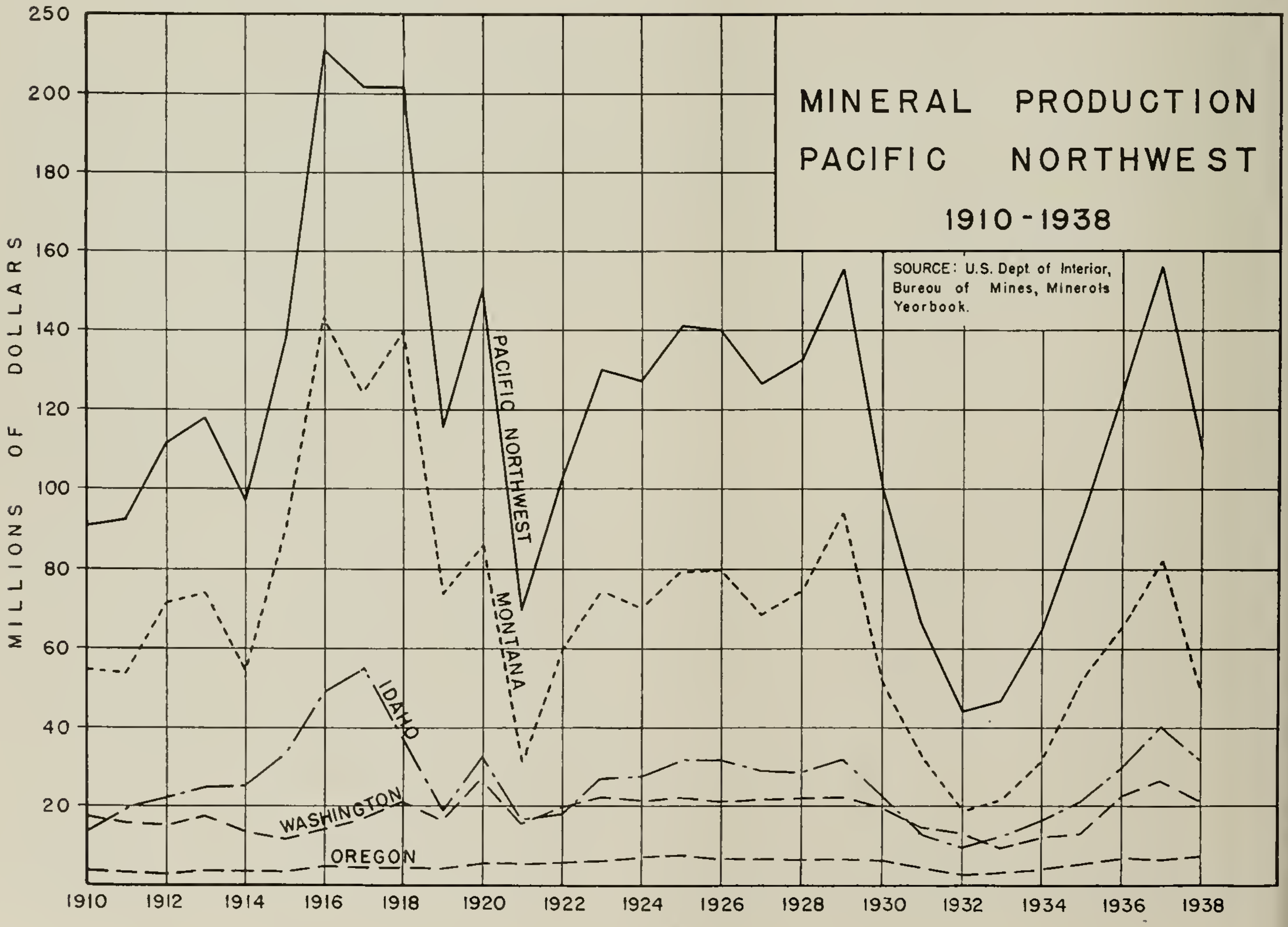


Figure 35

value of the average annual production for the three decades was as follows:

1910–1919	$151, 000, 000
1920–1929	127, 000, 000
1930–1938*	89, 000, 000

*Average for 9 years, data for 1939 not being available.

TABLE 2.—*Value of mineral production in the Pacific Northwest*

[In millions of dollars]

Year	Idaho	Montana	Oregon	Washington	Total
1938	31.7	48.6	7.5	21.2	109.0
1937	40.6	82.1	6.6	26.7	156.0
1936	30.0	65.6	7.1	22.9	125.5
1935	21.4	52.1	5.6	13.7	92.7
1934	16.7	31.4	4.2	12.9	65.3
1933	12.4	21.7	3.5	9.4	47.0
1932	9.5	19.0	3.0	12.8	44.3
1931	13.2	32.4	5.0	14.8	65.4
1930	22.9	51.0	6.2	20.1	100.1
1929	32.1	93.8	6.9	22.4	155.3
1928	28.6	74.8	6.7	22.1	132.1
1927	29.2	68.3	6.8	22.0	126.2
1926	31.8	79.8	6.9	21.3	139.7
1925	31.6	79.3	7.8	22.4	141.1
1924	27.8	70.6	7.4	21.2	127.0
1923	27.1	74.7	6.1	22.2	130.0
1922	18.5	59.4	5.5	19.7	103.1
1921	16.5	30.2	5.2	17.6	69.5
1920	32.4	85.9	5.5	26.7	150.5
1919	19.0	73.6	4.0	18.3	114.9
1918	36.9	139.3	4.2	21.0	201.4
1917	55.2	123.6	4.1	18.6	201.5
1916	49.2	142.6	4.5	14.5	210.9
1915	33.6	89.1	3.7	11.5	137.8
1914	24.9	54.2	3.3	13.8	96.3
1913	24.6	72.1	3.6	17.6	117.9
1912	21.8	71.6	2.6	15.3	111.3
1911	19.4	53.5	3.2	15.9	92.0
1910	15.4	54.4	3.7	16.7	90.3

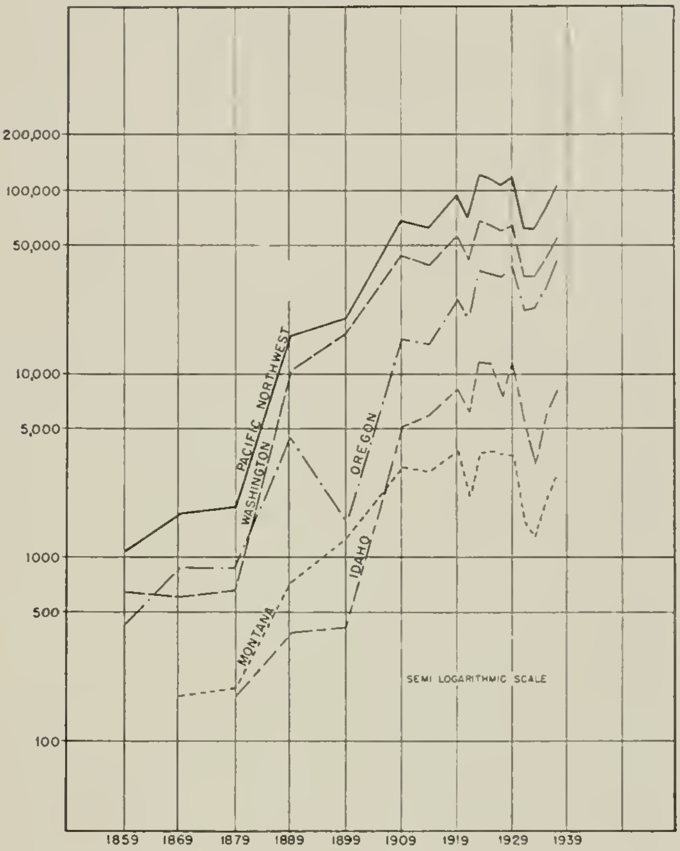
Source: *Minerals Yearbook*, U. S. Department of Interior, Bureau of Mines.

While the sharp decline in the last decade is undoubtedly in large part due to the prolonged depression, reduction between the first and second decades seems to reflect depletion of more profitable deposits, and probably increasing competition from lower cost sources. Production will undoubtedly be high during the period of the war emergency, but a more permanent expansion of mining is to be expected only if there is increased demand for the output of present workings and for the output of deposits not now being exploited.

Forest Products

The Pacific Northwest still contains the greatest virgin forests in the United States. While the forest areas may be classified in several ways, the broadest significant classification is one which distinguishes between the Douglas-fir region and the pine region. The distinction may appear to depend merely on the botanical classification of the principal forest growth, but there are important geographic and economic differences between the two regions. Because of this, it is desirable to consider the forest resources of the Douglas-fir and pine regions separately, a task greatly facilitated by the fact that the United States Forest Service has recently completed forest surveys of the Douglas-fir region[13] and the Ponderosa pine region of Oregon and Washington.[14] Preliminary reports of the Forest Survey are also available for much of the forest area of Idaho, Montana, and three counties in northeastern Washington that were not included in the study of the Ponderosa pine region. A preliminary statement of the situation in northern Idaho has been published.[15] The discussion of the forest resource in the areas for which the final report is not available must be somewhat more tentative than for the other regions.

AVERAGE NUMBER OF WAGE EARNERS
FOREST PRODUCTS INDUSTRIES
1859-1937



SOURCE U S CENSUS OF MANUFACTURES

FIGURE 37

The Douglas-fir region is that part of the Pacific Northwest lying west of the summit of the Cascade

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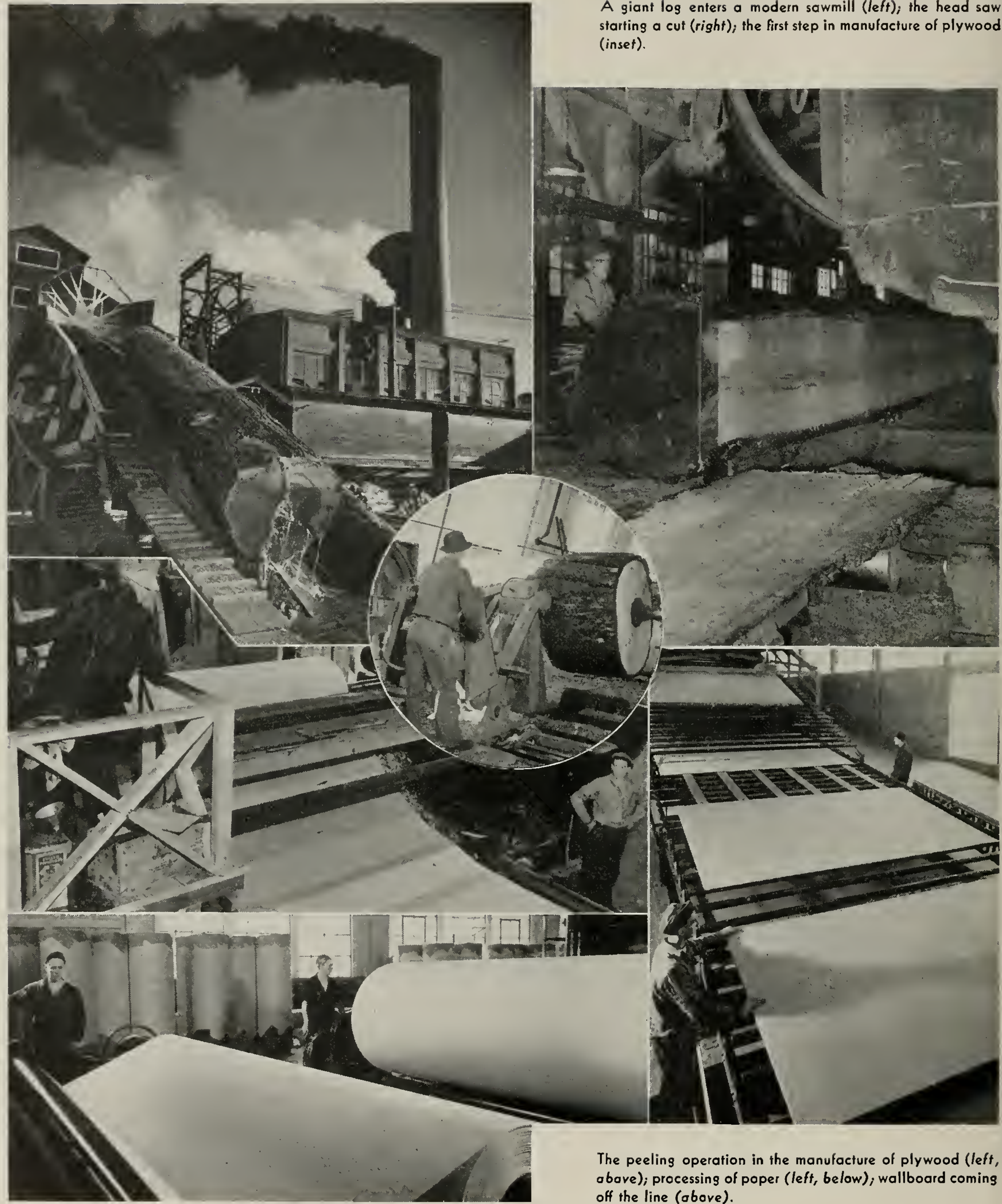
[13] H. J. Andrews and R. W. Cowlin, *Forest Resources of the Douglas Fir Region*, United States Department of Agriculture, Miscellaneous Publication, No. 389, 1940.

[14] R. W. Cowlin, P. A. Briegleb, and F. L. Moravets, *The Ponderosa Pine Region of Oregon and Washington*, United States Department of Agriculture. (Now in manuscript form.) See also, *Forest Resources of the Pacific Northwest*, Report by the Pacific Northwest Regional Planning Commission, National Resources Committee, 1938.

[15] S. Blair Hutchison and R. K. Winters, *Northern Idaho's Forest Problem—1941*, Northern Rocky Mountain Forest and Range Experiment Station, Forest Survey Release No. 19.



A giant log enters a modern sawmill (*left*); the head saw starting a cut (*right*); the first step in manufacture of plywood (*inset*).

The peeling operation in the manufacture of plywood (*left, above*); processing of paper (*left, below*); wallboard coming off the line (*above*).

Figure 36. Forest Products Industries in the Pacific Northwest.

Mountains. It contains a greater volume of saw timber than any other forest region in the United States. This is due both to the large size of its trees and the density of its stand. The Forest Service has estimated that in 1933 the Douglas-fir region contained 546 billion board feet log scale of saw timber.[16] The significance of this figure will be appreciated when it is realized that the national production of softwood lumber from 1925 to 1940 averaged less than 22 billion board feet per annum. It should not be assumed, however, that all of this great stand of timber is commercially available for exploitation at the present time.

Large scale production of lumber in the Douglas-fir region is concentrated in a few areas. This concentration reflects the importance of transportation to the Pacific Northwest. The lumber industry has had its most important development in the Puget Sound, the Grays Harbor, and the Columbia River areas. Puget Sound and Grays Harbor were originally largely surrounded by great stands of fine timber. The ready accessibility of this timber to water transportation is the principal explanation of the great expansion of forest products industries in Washington during the Eighties, and the continuance of their rapid growth to 1910. It may be seen from figure 37 that during this period, Washington forged ahead of Oregon in number of wage earners in forest products industries and by 1909 had an average of 45,000 wage earners so employed, while Oregon had only 16,000. Since 1914, the industry has expanded more rapidly in Oregon than in Washington, the comparable figures for 1937 being 41,000 and 56,000 respectively.

The stand of timber immediately accessible to the Columbia River was less than in the Puget Sound and Grays Harbor areas. Large quantities of good timber were available, however, and important industries have developed in this region.

The largest population concentrations in the Pacific Northwest are in the Puget Sound and lower Columbia River areas, and the distribution of forest products industries has undoubtedly contributed to this population pattern. The location of sawmills in the Douglas-fir region in 1934 is shown in figure 38, taken from the Forest Survey report. While small mills are widely scattered over the area, there is evidence of definite concentration of larger mills in the Puget Sound, Grays Harbor, and lower Columbia River districts. Other forest products industries, pulp and paper mills, sash and door factories, furniture factories, plywood plants, and similar wood-using concerns show an even greater concentration in these districts. The Forest Service states that these districts accounted for 85 percent of the lumber produced in the Douglas-fir region from 1925–33, for 95 percent of the pulp, and practically all of the veneer.[17]

Future Production

The location of the large timber-consuming industries has, of course, affected the depletion pattern. This is described in the following manner in *Forest Resources of the Douglas Fir Region*.[18]

> The earliest logging operations in the region were in the vicinities of Puget Sound and the Columbia River. In the Columbia River district logging began in a small way more than a century ago. Supplies of saw timber in these units are still large but are being depleted rapidly, particularly in some Oregon counties. In Washington, logging in this district has been greatly stimulated of late by the establishment of large mills at Longview. Continued large-scale logging has greatly depleted the accessible privately owned saw timber in the Puget Sound district—nearly to exhaustion in the counties east of the Sound. In Grays Harbor County, the comparatively easy logging ground and dense stands of high-quality timber invited early operation. This county outranked all others in the region in aggregate sawlog production from 1925 to 1933, although cutting declined rapidly in the latter part of the period and in 1933 was exceeded by that of Cowlitz County.

If cutting continues at the present rate, the production of sawlogs in the Puget Sound, Grays Harbor, and Columbia River districts will inevitably decline, and production in Oregon south of the Columbia River district will increase. Adjustment to this condition will probably come about both through longer log transportation and through migration of mills. Eventually, a sharp reduction in the scale of lumber production will be necessary, with most unfortunate results for the population of the area and, in all likelihood, increased lumber costs for the consuming public.

Another alternative would be the adoption of a sustained-yield program, under which the forest practices followed would contemplate the indefinite continuance of the forest resource and the attainment of a situation in which growth would equal depletion. Such a program would necessitate some reduction from present rates of cutting but would eventually make possible a rate of utilization of the forest resource not much below the present level. The average annual cut in the Douglas-fir region from 1925–33 was about 8 billion board feet. From 1934–39 it was under 7 billion board feet. It is estimated that a sustained-yield program would involve reduction of the annual cut to the neighborhood of 6 billion board feet for a transitional period of several decades, but would eventually make possible continuous production at the rate of approximately 8

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[16] H. J. Andrews and R. W. Cowlin, *Forest Resources of the Douglas-Fir Region*, U. S. D. A., Misc. Pub., 389, p. 13.

[17] *Ibid.*, p. 97.

[18] *Ibid.*, p. 46.

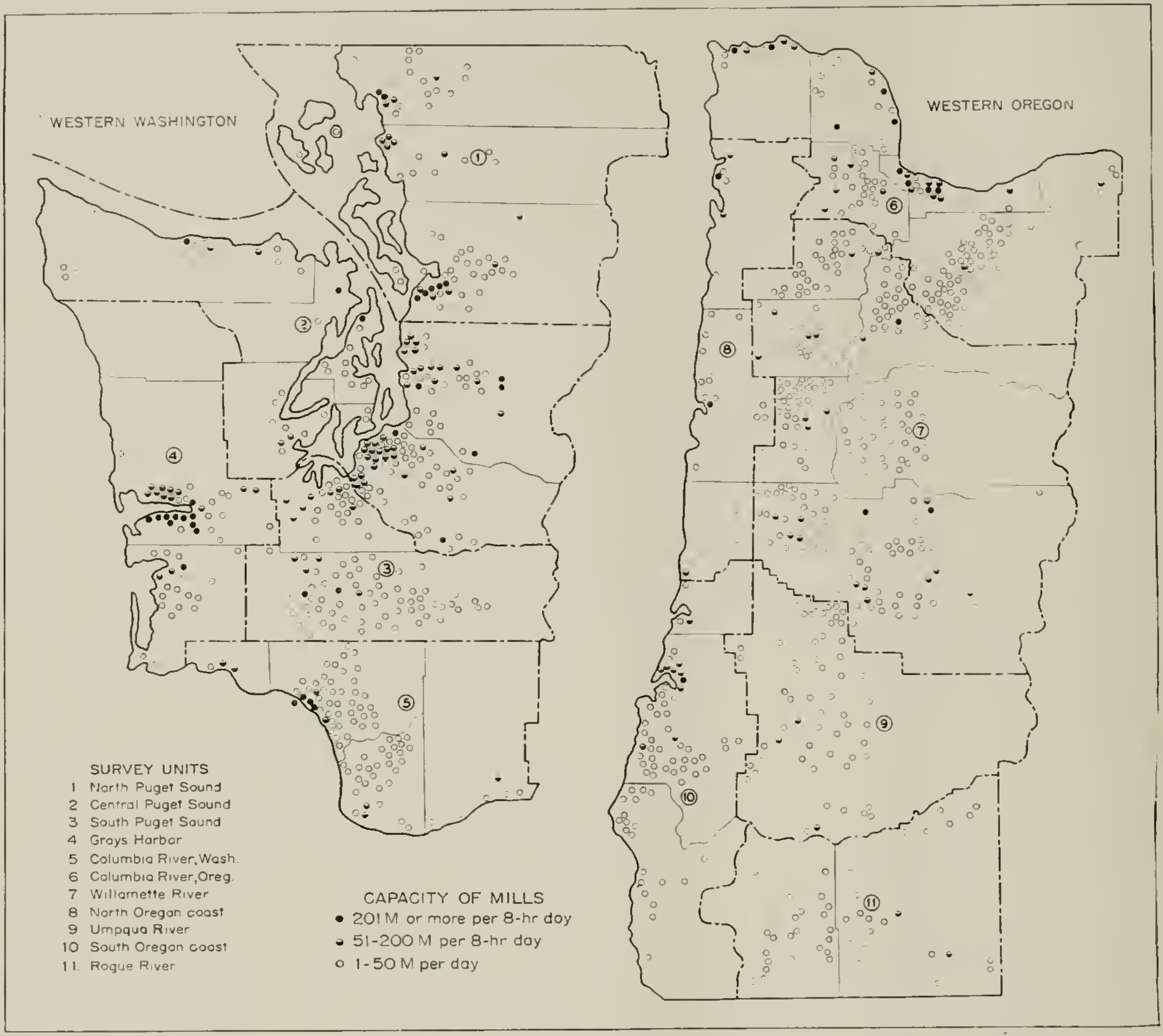

FIGURE 38

billion board feet annually. Neither of the alternative methods of managing the forest resource could assure production greatly expanded over present levels for any long period of time.

In many respects, present methods of utilizing our forest resource are very wasteful. Methods of logging, and imperfect utilization practices, for example, not only waste material that might be made to serve useful purposes, but may hinder restocking or increase fire hazards. Mill wastes are frequently disposed of by burning. Much progress has been made in recent years in the conversion of mill wastes into useful products, such as lath, shingle bands, fuel and pulp chips.[19] An interesting example of an unfortunate retrogression in use of waste has been the reduction in the proportion of wood waste used by pulp mills. In 1929 mill waste constituted 40 percent of the pulpwood consumption in the region, but by 1936, only 11 percent of the consumption was in the form of waste.[20] This has been largely due to reduction in the production of hemlock lumber which has arisen from what appears to be an irrational prejudice against western hemlock in eastern and California markets. Presumably, this condition could be rectified by proper promotion.

Water transportation, which has played such an important part in the Douglas-fir region, is of negligible importance in the pine region. Nevertheless, high concentration of the industry has taken place, and has resulted in an uneven depletion pattern. The average annual cut of trees of saw-timber size in the Ponderosa pine region from 1937–39 was 1,747 million board feet, over half of which came from two districts in south-central Oregon. The Klamath district, primarily the area around Klamath Falls, accounted for 38 percent of the total cut and the Deschutes district, primarily Bend and Prineville, for 20 percent.

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[19] *Ibid.*, p. 92.

[20] *Ibid.*, p. 109.

A sustained-yield program designed to increase growth rates as rapidly as possible (but involving considerable changes in cutting practices) would make it possible to maintain an annual cut of 1,126 million board feet in the Ponderosa pine region, an amount not greatly below the actual cut during the period 1925–36. With cutting practices more comparable to those at present employed, a sustained-yield program would require a reduction to no more than 930 million feet. The ultimate sustained-yield cut would be 1,404 million board feet.[21]

It is not possible at this time to make as comprehensive statements with respect to the forest industries of Idaho and Montana as were made for Oregon and Washington, the forest surveys in the former States not being completed. The very valuable white pine in Idaho has been extremely important in the forest industry of the State and is in an advanced stage of depletion.[22] Because of its inaccessibility, much of the remaining timber in Idaho and Montana can be successfully exploited only at prices much higher than any yet experienced. An important increase in forest products industries in these two States is, therefore, not to be expected.

A sustained-yield program would have great social and economic advantages for the region and the Nation. The value of the forests is so great that every effort should be made to protect them from fire, insects, and disease, and to perpetuate them as a continuing source of useful materials and of recreation for the Nation's population. Serious difficulties must be overcome if these desirable results are to be achieved. These difficulties arise not so much from the complexity of the management problem as from the diversity of land ownership, and the unattractiveness of sustained yield to private owners faced with the necessity of paying taxes, carrying the financial load involved in postponing for many years the harvesting of their timber, and sustaining the risks of fire, insect, and disease losses, as well as of decline in stumpage prices. Methods of solving these problems must be found if the maximum long-term benefits from the forest resources of the Pacific Northwest are to be obtained.

Forest Products Industries

While the drain on the forest resource of the Pacific Northwest cannot continue indefinitely at the present level and prudence dictates smaller drain in the near future, the significance of the resource in the economy of the region may be changed by an alteration in the nature of the forest products industries. A given cut of timber provides a minimum of employment in the area when the sawlogs are exported. There is somewhat more employment involved where "giant squares" or sawn timbers are exported. The chief illustration of such activity has been the shipment of Port Orford white-cedar logs and sawn timbers to Japan.[23] At the other extreme are wood-using industries that involve considerable processing of the wood. Examples are sash and door making and furniture production. If industries of this type are becoming more important, it is possible that a smaller annual cut may continue to support the present population—or even a larger one.

In the last 20 years, there has been an increase in the importance of activities involving a greater amount of processing of wood. In 1909, over 95 percent of the workers in the forest products industries were employed in the manufacturing concerns coming under the general heading of lumber and timber products. By 1919, the number so classified was still over 90 percent. By 1937, this census classification accounted for only 80 percent of the wage earners. Other activities that had become particularly important were pulp and paper manufacturing, furniture manufacturing, and plywood production.

The growth of the pulp and paper industry in Oregon and Washington since 1919 is shown in table 3 and figure

TABLE 3.—*Pulp and paper production and pulpwood, consumption, 1925–40*

[In thousands of tons]

Year	Pulp production			Paper production			Pulpwood consumption		
	Oregon	Washington	Total	Oregon	Washington	Total	Oregon	Washington	Total
1925	161	162	323	146	179	325	209	241	450
1926	179	199	378	-----	-----	-----	233	306	539
1927	200	268	468	187	233	420	267	456	723
1928	213	249	462	198	309	507	308	652	960
1929	257	524	781	222	382	604	341	956	1,297
1930	249	566	815	129	395	524	351	1,000	1,351
1931	238	580	818	200	375	575	320	1,026	1,346
1932	187	421	608	183	313	562	265	688	953
1933	189	584	773	198	382	580	242	1,095	1,337
1934	240	709	949	221	418	639	322	1,204	1,526
1935	262	776	1,038	242	466	708	369	1,324	1,693
1936	303	896	1,199	262	507	769	424	1,509	1,933
1937	339	1,184	1,523	274	546	820	511	2,170	2,681
1938	250	837	1,087	235	472	707	342	1,450	1,792
1939	271	1,107	1,378	277	557	834	469	1,916	2,385
1940	363	1,472	1,835	291	585	876	621	2,554	3,175

Source: *Pacific Pulp and Paper Industry*, Review numbers, 1937 and 1941; Bureau of Census, *Census of Manufactures*, 1929; and Bureau of Census, *Forest Products*, 1928

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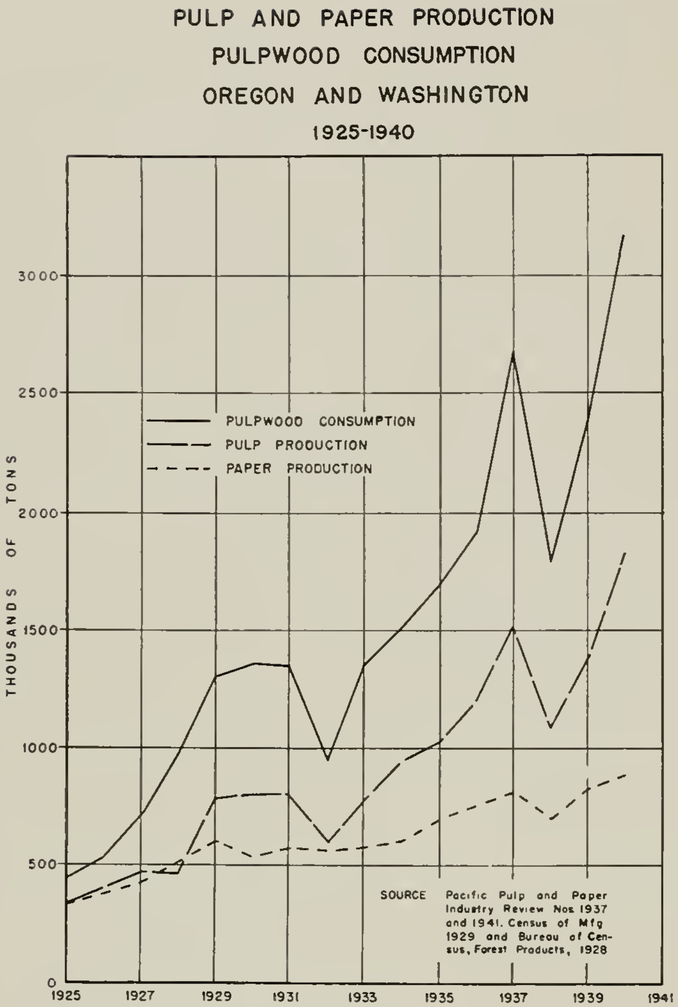
[21] R. W. Cowlin, P. A. Briegleb, and F. L. Moravets, *op. cit.*

[22] *Forest Resources of the Pacific Northwest*, *op. cit.*, p. 33. See also, S. Blair Hutchison and R. K. Winters *op. cit.*

[23] *Forest Resources of the Douglas Fir Region*, pp. 84–85.



PULP AND PAPER PRODUCTION
PULPWOOD CONSUMPTION
OREGON AND WASHINGTON
1925-1940

SOURCE Pacific Pulp and Paper Industry Review Nos 1937 and 1941. Census of Mfg 1929 and Bureau of Census, Forest Products, 1928

FIGURE 39

39. In 1919, this industry employed an average of 2,108 wage earners. By 1937, the number of wage earners had risen to 11,647, a fivefold expansion in 18 years. It is possible that this industry employs a somewhat larger number of workers per thousand cubic feet of wood consumed than the lumber industry. It is even more likely that the average wages paid per thousand cubic feet of wood consumed are higher, although the wages of pulpwood cutters have often been extremely low. Pulp and paper mills certainly do offer their employees more stable employment, less subject to seasonal fluctuations and less sensitive to variations in general business conditions.

The furniture manufacturing industry is much older in the Pacific Northwest than pulp and paper production. It has grown rapidly, however, in the last two decades. In 1919, it employed an average of 1,686 wage earners, and its products had a value of about $6 million. In 1937 it had 4,066 wage earners and products valued at more than $13 million. Some of the raw materials used by the furniture industry come from outside the Pacific Northwest, but the major sources of supply are in the region. Furniture production offers employment opportunities within the region in the further fabrication of wood produced by lumber mills without imposing any considerable additional burden on the forest resource.

The production of plywood is relatively new and in recent years has been one of the most rapidly growing industries in the Pacific Northwest. This may be seen from table 4 and figure 40. The remarkable growth from an annual production of less than 400 million square feet in 1934 to approximately 1,200 million square feet in 1940 has been due to a number of factors. The development of processes that make possible the construction of a moisture-proof plywood has been one of the most important. The strength and lightness of plywood and the greater speed of construction made possible by large panels have given it an ever-widening market. In the past the plywood industry has used only large and very high quality logs the supply of which is limited. Technological changes in plywood manufacture making possible the use of smaller and lower quality logs, and tractor and truck methods of moving logs, have changed the outlook for the future of this industry.[24] A greatly expanded plywood production could probably be accommodated by a sustained yield program. This would, of course, mean a reduction in other timber uses since under sustained yield the total cut could not exceed total growth.

Technological developments have played an important part in the growth of the plywood industry. Technical progress in chemical treatment of wood, in developing new materials made from wood or wood fiber, and in discovering new uses for wood products gives promise of increasing further the usefulness of the region's greatest material resource. New techniques and new industries should increase the capability of the for-

TABLE 4.—*Production of Douglas fir plywood in the Pacific Northwest, 1925–40*

[Million square feet in ⅜-inch 3-ply equivalent]

Year	Production	Year	Production
1925	153	1933	390
1926	173	1934	384
1927	206	1935	480
1928	276	1936	700
1929	358	1937	725
1930	305	1938	650
1931	235	1939	[1] 982
1932	200	1940	[2] 1,200

[1] Preliminary estimate by U. S. Forest Service.
[2] Estimate by *The Timberman*, January 1941.

Sources: United States Forest Service, and *The Timberman*, Plywood Edition, January 1941.

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[24] *Ibid.*, pp. 95–96.

ests as a basic support for the population. This could be brought about by making better use of materials now recovered from the forests, and by utilizing forest materials which are now wasted.

Advance in these new directions can be made only if more research is carried on, and if means are devised by which the results of such research can be realized in commercial operation. Research is now being carried on by the Forest Products Laboratory at Madison, Wisc., by university and trade association laboratories, and by some of the largest private manufacturing companies. Pilot plant operations are very largely—and commercial exploitation exclusively—confined to the large private organizations. Greater progress might be made if pilot-plant results and aid in commercial operation were available to smaller concerns and cooperative organizations. Multiplication of new activities—each one of which might be small—could contribute greatly to more complete and more permanent use of the forest resource.

Other Forest Uses

The economic and social contributions of the forests so far considered are those made when trees are cut and converted to useful purposes. But forests render extremely important services in other ways. Forested slopes are retentive of rainfall, thus reducing floods and soil erosion, which, in turn, alleviate the silting of streams and reservoirs, thereby aiding navigation, power development, irrigation, domestic and industrial water supplies, and recreation.

In the Pacific Northwest, the forests provide recreational facilities for residents in the region and attract many visitors from other areas. Evidence of this is that in 1939 almost 1,400,000 persons visited the National parks in the Pacific Northwest, and almost 3,000,000 persons used the National forests for recreational purposes. While these and the other values of standing forests cannot readily be stated in terms of dollars and cents, they have tangible commercial importance due to the income they bring in by attracting tourists to the region. Because of this and other largely immeasurable benefits to the population of the Pacific Northwest, strenuous efforts to preserve the tree cover are justified.

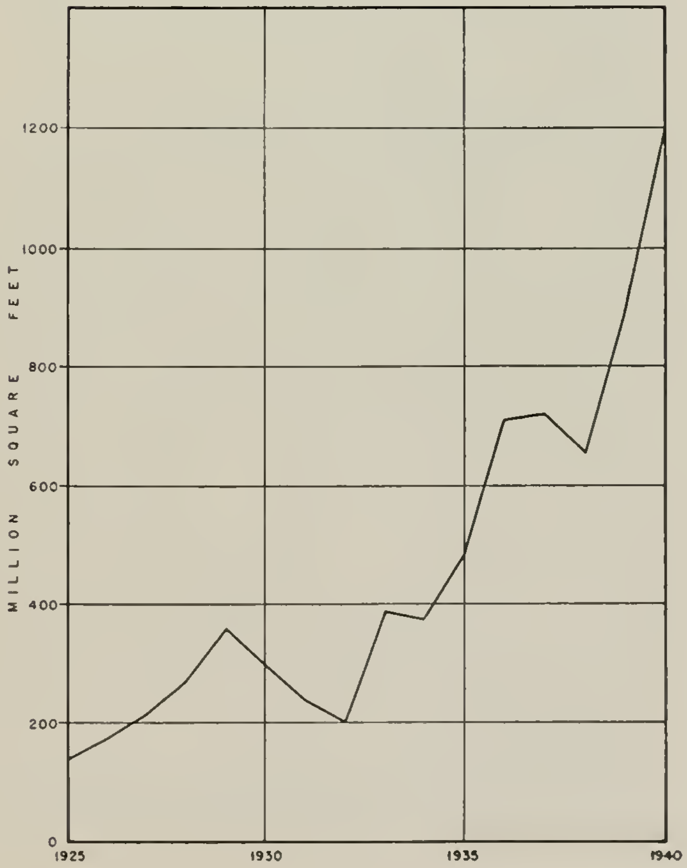
Agriculture and Food Processing Industries

From the beginning of settlement, agriculture has been a major economic activity in the area. The soils, the topography, and the climate making farming possible have, therefore, been one of the most important resources. Since part II of this report deals with the possibilities of agricultural development, the purpose here will be only to relate agricultural to industrial activities and to the general economic pattern of the region.

It may be observed from the data presented in figure 34 that, since 1860, agriculture has been the occupation of the largest single group of gainful workers. It has been a continually expanding group. In recent years, the relative increase has been small, but it contrasts with the decline in agricultural employment that has characterized most of the country. From 1909 to 1937, the index of agricultural employment computed by the WPA national research project for Idaho, Oregon, and Washington, combined, increased from 83 in 1909 to 108 in 1936. The national index fell from 107 to 97 during the same period.[25]

The region produces wheat, dairy products, fruits,

PRODUCTION OF DOUGLAS FIR PLYWOOD
PACIFIC NORTHWEST
1925-1940



SOURCE: U. S. FOREST SERVICE and THE TIMBERMAN, PLYWOOD EDITION 1941.

FIGURE 40

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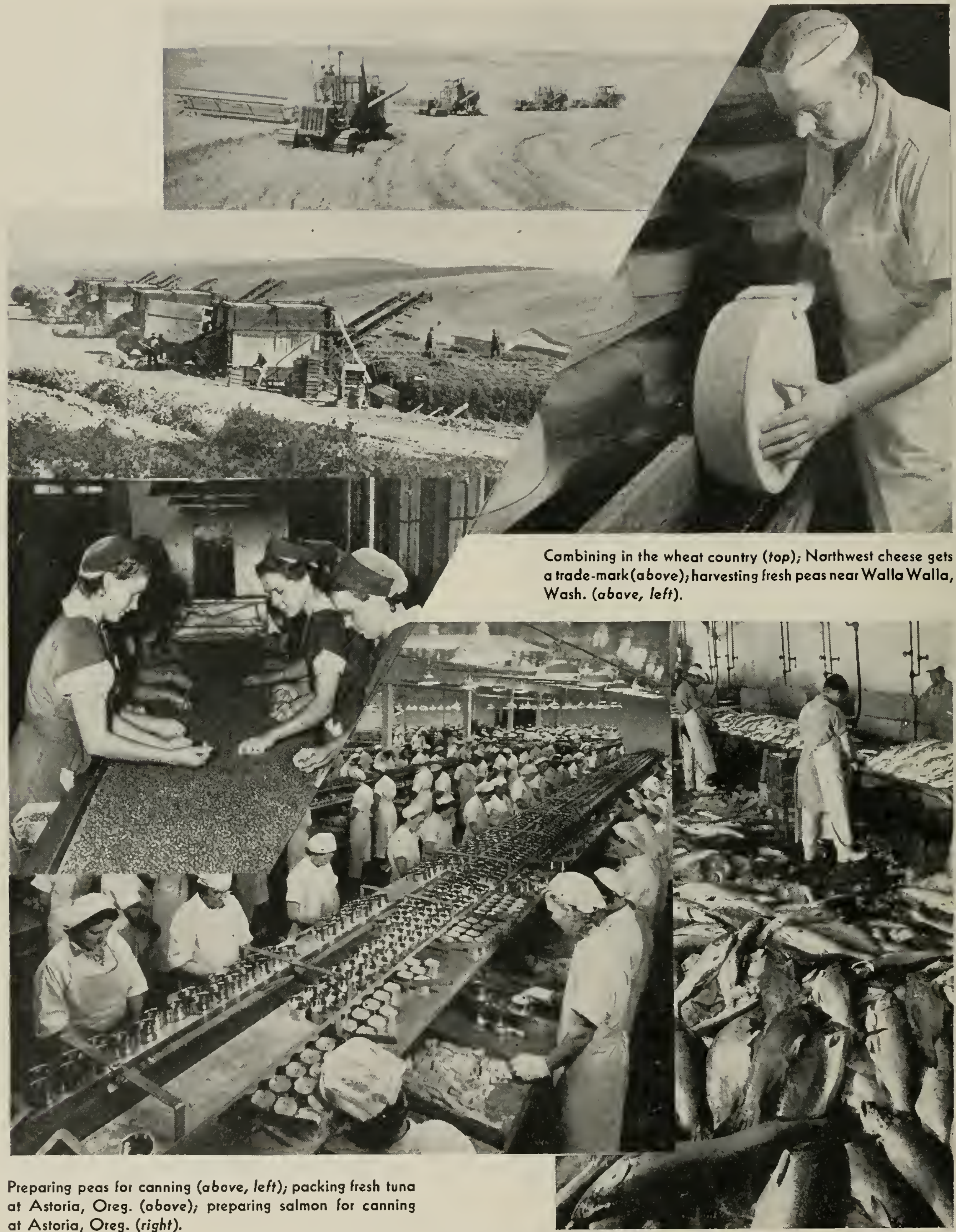
[25] *Trends in Employment in Agriculture, 1909–1936*, Works Progress Administration, National Research Project, Report No. A–8, 1938, p. 71.



Combining in the wheat country (*top*); Northwest cheese gets a trade-mark (*above*); harvesting fresh peas near Walla Walla, Wash. (*above, left*).

Preparing peas for canning (*above, left*); packing fresh tuna at Astoria, Oreg. (*above*); preparing salmon for canning at Astoria, Oreg. (*right*).

Figure 41. Food Processing Industries in the Pacific Northwest.

vegetables, poultry, sheep, and cattle in large quantities. Specialized agriculture is very common, with the result that the prosperity not only of individual farms but of entire communities frequently depends on the market for a particular commodity.

Much of the agricultural production is shipped out of the region in the form in which it leaves the farm. Considerable quantities, however, are processed for consumption in the region and for shipment to other areas. Among manufacturing industries, processing of farm commodities is second in importance only to forest products industries. Agriculture, therefore, in addition to providing employment for the largest group of gainful workers, supplies the raw materials for important manufacturing industries, including fruit and vegetable packing and preserving, meat packing, flour milling, and textile manufactures.[26] The growth in the average number of wage earners engaged in these industries from 1860 to 1937 is shown in figure 42. Processing of agricultural products grew rapidly first in Oregon. For both Oregon and Washington, however, the highest growth rate was in the Eighties, the decade of the railroads. Between 1889 and 1899, Washington forged ahead to become the leading State in the region in this respect. Montana's most rapid growth came in the same decade, while the highest rate of increase was reached in Idaho in the following decade. In all States, there was recession in the early Twenties and Thirties, but growth has continued and in every case the average number of wage earners in 1937 was greater than for any previous year.

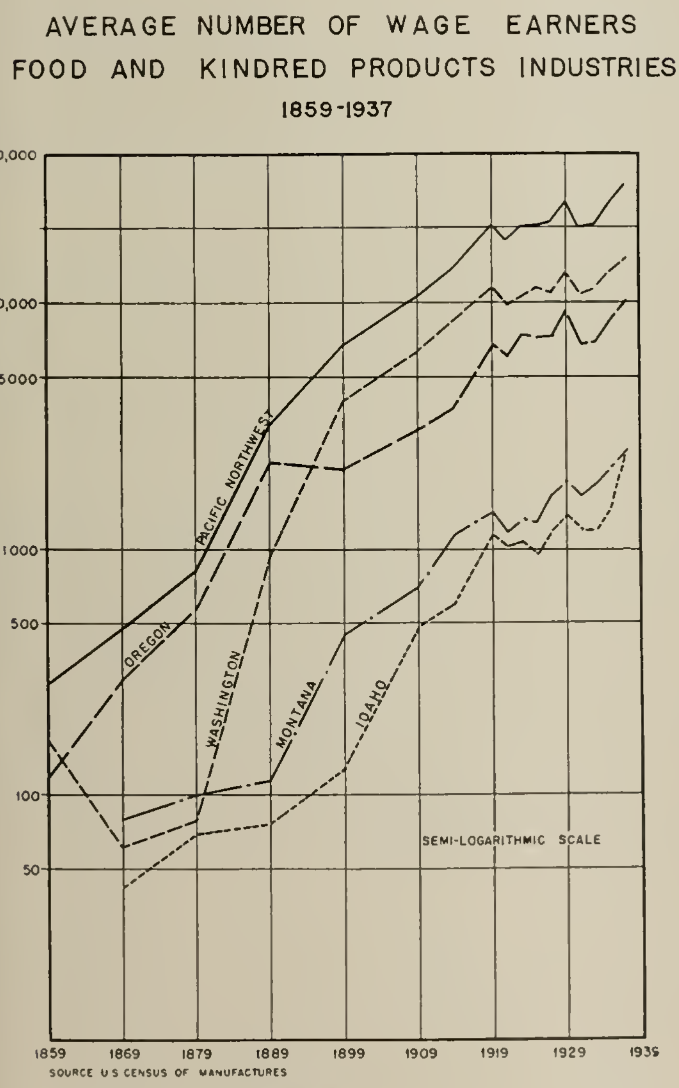


FIGURE 42

Location of Industries

Conditions determining the location of agricultural processing industries are of many different types. In some cases, such as fruit packing, the industrial activity may consist of the preparation of the commodity for shipment and marketing and can be looked upon as an extension of the farm activity. In other cases, such as fruit and vegetable canning and freezing, the perishable nature of the farm product makes processing near the field or orchard desirable. In flour milling, where both raw material and product are easily transported, more complex locational factors come into play, including transportation facilities, power and labor supplies, and markets both for products and by-products. Class and commodity freight rate discrimination is frequently important. Where, as is frequently the case, low commodity rates apply to the raw material and higher class rates to the finished product, location of the industry near the market is encouraged. A case in which location has been influenced by the difference in freight rate structure between rail and water transportation is found in wool textile manufacturing in the Pacific Northwest. Railroad rates, considerably higher on the manufactured articles than on raw wool, favor the shipment of wool to the manufacturing area centering around Boston. Water rates to eastern markets for textile goods have been little higher than for wool. In addition, wool in the grease weighs more than twice as much as scoured wool. The by-product dirt and grease has little value and, ordinarily, is not utilized. As a result, Pacific coast textile mills in delivering their finished products to eastern markets by water have a total freight charge smaller than that involved in the shipment of the raw material to the East.

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[26] Textile manufacturing in the Pacific Northwest is confined to wool products, the raw material for which comes almost exclusively from the region.

TABLE 5.—*Pack of canned peas in Washington and Oregon, 1932 to 1939*

[In thousands of cases]

	Oregon	Washington	United States	Oregon and Washington as percent of United States
1932 actual cases	2	251	10, 117	------------
1933 actual cases	28	474	12, 481	------------
1934 actual cases	11	840	15, 360	------------
1935 actual cases	289	1, 671	23, 762	------------
1936 No. 2 case equivalent	688	2, 532	16, 553	19
1937 No. 2 case equivalent	1, 223	2, 271	23, 467	15
1938 No. 2 case equivalent	1, 577	1, 892	25, 459	14
1939 No. 2 case equivalent	1, 627	1, 576	16, 074	20

Source: Figures 1932 to 1935, from *Western Canner and Packer*, vol. 32, No. 5. Figures for 1936 to 1939, U. S. Department of Agriculture, *Statistical Yearbook*, 1940.

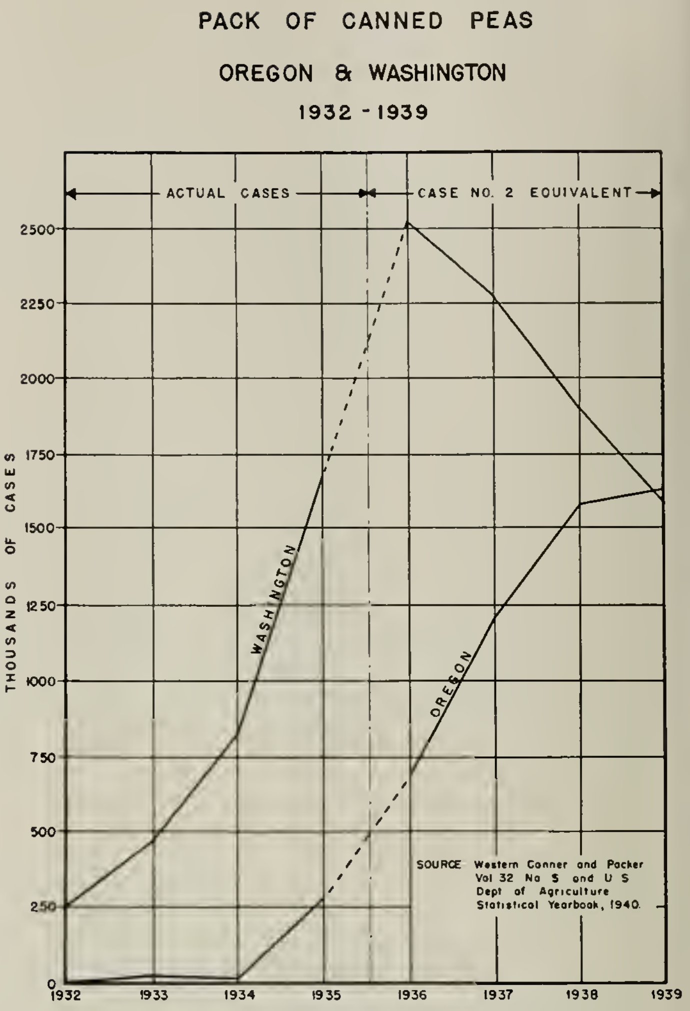
An interesting case of a shift in industry location is found in the development of the pea-canning industry in Washington and Oregon in recent years. In table 5 and figure 43 the pack of canned peas in Washington and Oregon is compared with the national total from 1932 to 1939. These States packed between 2 and 3 percent of the total for the United States in 1932 and 20 percent of the total in 1939. Washington produced about 250,000 cases in 1932, and in the peak year for the State, 1936, packed the equivalent of 2,532,000 cases in No. 2 cans. Oregon packed only 1,720 cases in 1932, but was the leading State in the country in 1939 with 1,627,000 cases (No. 2 equivalent).

In the production of frozen peas, Washington and Oregon hold an even more commanding position. The first commercial pack of frozen peas was made at Hillsboro, Oreg., in 1929. The industry grew rapidly. According to estimates of informed persons in the trade, about 1,750,000 pounds were frozen in Washington and Oregon in 1934, 4 million pounds in 1935; and over 8 million pounds in 1936. The *Western Canner and Packer* estimates of the frozen pea pack for 1937 to 1939 (including peas frozen with carrots) are given in table 6.

TABLE 6.—*Pack of frozen peas in Washington and Oregon, 1937–39*

Year	Frozen pea pack of		Washington and Oregon as percent of total
	Washington and Oregon	United States	
	Million pounds	*Million pounds*	
1937	11.0	26.3	41.8
1938	16.1	34.6	46.5
1939	10.4	26.9	38.7

The sudden development of the pea canning industry in Washington and Oregon cannot be explained by changing market conditions or the discovery of a new resource. Pea freezing, of course, was the outgrowth of technological advance, and its success in this region may reflect natural advantages in pea production. If, however, there are such natural advantages, why had they not been recognized by the pea canning industry much earlier? A possible explanation is that they had been recognized but investments in plants in older pea canning districts, combined with other forms of inertia, prevented the shift from taking place. The drought years were particularly unfortunate for middle western packers and were probably the occasion for the establishment of plants in the Pacific Northwest. The largest pea packing plants in Oregon and Washington are operated by interests from the Middle West.



SOURCE Western Canner and Packer Vol 32 No 5 and U S Dept of Agriculture Statistical Yearbook, 1940.

FIGURE 43

Expansion

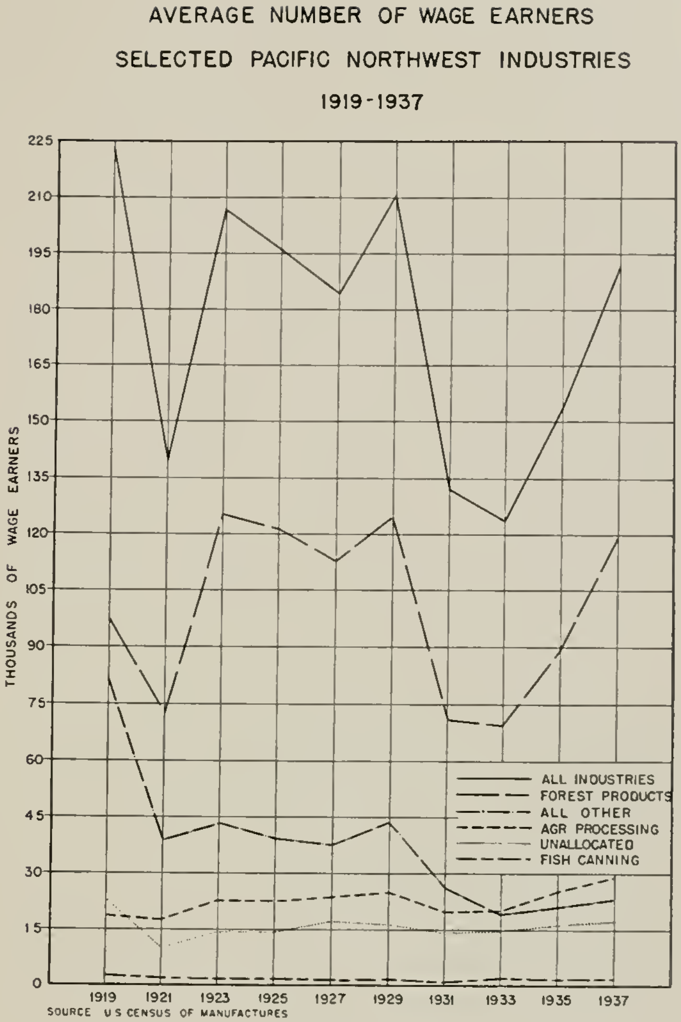
The limit of agricultural expansion in the Pacific Northwest has not been reached. As was shown in Part II of this report, there are opportunities for new farms and for increased production by existing farms. This expansion should result in the growth of industries engaged in processing agricultural commodities. In addition, the full agricultural advantages of the region are not being exploited and shifts similar to that in pea canning may be experienced in other lines of activity. Spectacular increases are not to be expected, but the assumption that recent trends will continue seems not unwarranted.

Other Industries

There are important manufacturing industries in the Pacific Northwest that cannot be related directly to the four resources already discussed, fisheries, mining, forests, and agriculture. Many of these are service industries, such as baking, and printing and publishing, which find a local market in other industries and the general population of the region. There may be other industries that find markets for their products outside the region, but there is no broad classification of commodities that has not already been discussed that are shipped out of the area in larger quantities than they are received.

The average number of wage earners from 1919 to 1937 in each of the categories of manufacturing considered in this discussion is shown in figure 44. The averages for industries that the Census has failed to classify to avoid disclosure of individual operations have been designated "unallocated." Fluctuations in the figures for this group may arise from changes in scale of activity, or from an increase in the number of establishments that makes it possible to include the information in the proper category. In the latter case, a change also appears in one of the other groupings, which is in part due to the change in classification rather than to a change in industrial activity.

The sharp decline in the number of wage earners in the "All Other Industries" group from 1919 to 1921 is largely accounted for by the virtual abandonment of the shipbuilding industry in the Pacific Northwest between these two Censuses of Manufactures. In 1919, almost 43,000 wage earners were engaged in shipbuilding in the region, and by 1921 the average number employed was less than 4,000. Shipbuilding and aircraft manufacturing are activities that are now being stimulated by war necessities. Unless basic changes have come about since the war of 1914–18, severe decline in these industries may follow the cessation of hostilities.



SOURCE U S CENSUS OF MANUFACTURES

FIGURE 44

It will be noted that the average number of wage earners in the "All Other Industries" classification in the Pacific Northwest has declined drastically even from the figure of 1921. There has been some increase in the number of wage earners in unallocated industrial activities, but the larger increases have been in agricultural processing industries, and particularly in forest products industries. Up to 1937, no outstanding new resource or line of industrial enterprise had risen to take the place of these two mainstays of the industrial structure of the Pacific Northwest.

PART III
2. THE PRESENT ECONOMY

The foregoing sketch of the economic development of the Pacific Northwest indicates how the region has grown and the resources exploited in the process. Little indication, however, has been given of the way in which this section of the country fits into the economy of the whole Nation; of the contribution it makes to, and the benefits it receives from, the rest of the country. Some understanding of this relationship is essential to an appreciation of the present condition of the region, and to a reasonable forecast of its industrial future.

The External Trade of the Pacific Northwest

Many of the economic relationships between the Pacific Northwest and other parts of the country escape the observation of the compilers of statistical information. Tourist expenditures, family remittances, insurance payments, loans, interest and principal payments, rent and purchase money payments, and many other forms of economic activity flow back and forth between the region and other areas without leaving records adequate to reveal their nature and extent. The movement of physical commodities is an important exception, and much may be learned of the economic interrelationships between different parts of the country by study of the movements of commodities. Such a study was made for 1929 by the Pacific Northwest Planning Commission.[27] A further investigation covering the years 1934–1938 is being completed, and a report on the results will be issued shortly.[28] Some of the information obtained will be presented here.

Records are not generally kept of the movements of commodities over state boundaries. Information is available on waterborne commerce, and the class 1 railroads report by commodity for each State the carload lot quantities "originated" or "terminated" within the State. Ignoring truck traffic and less-than-carload rail freight, the net receipts from other areas or the net shipments to other districts are the difference between the quantities "originated" and "terminated". When the quantities for each commodity are multiplied by appropriate value figures, it is possible to determine the economic significance of the movement of particular commodities or groups of commodities. Because truck and less-than-carload freight are ignored, the results are not significant when the amounts involved are small. For commodities moving in large volume, however, the figures are accurate enough to give a broad picture of commodity movements.

Exports

Such a broad picture is presented for the Pacific Northwest in table 7 and figure 45. The significance of agriculture in the economy of the region is reflected by the heavy net shipments in the first two groups, Products of Agriculture, and Animals and Products. The net shipments of unprocessed farm products had a considerably higher value than processed products. The contrast between values of processed and unprocessed commodities was even greater for "Animals and Products," only $13 million out of a total value of $104 million being for processed products. The average value of all net shipments in the two farm products groups was $266 million while the average value of net receipts of agricultural and animal products was $27 million.

TABLE 7.—*Average annual value of net receipts and net shipments for the Pacific Northwest, by major commodity groups, 1934 to 1938*

[In millions of dollars]

Commodity group	Receipts			Shipments		
	Unprocessed	Processed	Total	Unprocessed	Processed	Total
Products of agriculture	13.5	8.2	21.7	93.4	68.1	161.5
Animals and products	.6	4.3	4.9	90.6	13.4	104.0
Products of mines	31.4	101.4	132.8	5.7	54.3	60.0
Products of forests	2.4	2.4	4.8	11.0	161.1	172.1
Manufactures and miscellaneous	-------	265.0	265.0	-------	19.8	19.8
Total	47.9	381.3	429.2	200.7	316.7	517.4

Source: Pacific Northwest Regional Planning Commission: *The External Trade of the Pacific Northwest.*

The importance of the forest base is shown by net shipments of forest products with an annual average value of $172,000,000. The relative unimportant shipments of unprocessed forest products took the form of logs, posts, poles, and piling.

The average net shipments of products of mines were valued at $60 million. Net receipts, on the other hand, amounted to $133 million annually. An indication of the importance of motor transport is found in the value of the net receipts of gasoline and refined oils which are classified as processed products of mines. This was $69 million annually. All the products of mines

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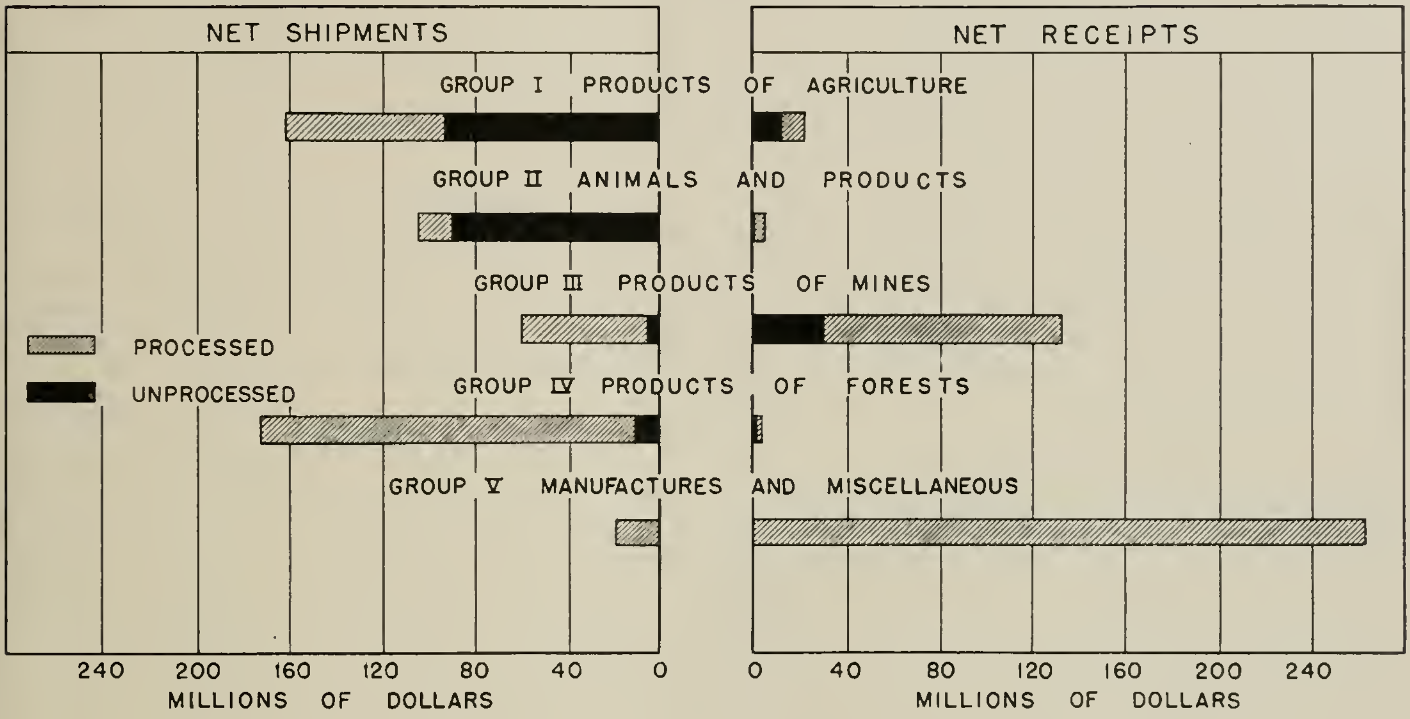
[27] Pacific Northwest Regional Planning Commission, *The Balance of Trade of the Pacific Northwest*, 1937.

[28] Pacific Northwest Regional Planning Commission, *The External Trade of the Pacific Northwest.*

AVERAGE ANNUAL VALUE OF NET RECEIPTS AND NET SHIPMENTS
PACIFIC NORTHWEST
BY MAJOR COMMODITY GROUPS
1934-1938



SOURCE: PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION, THE EXTERNAL TRADE OF THE PACIFIC NORTHWEST

FIGURE 45

shipped out of the region do not yield a return sufficient to pay for the gas and oil consumed.

To show the significance of the agricultural, forest, and mineral resources of the region, many products that the Census of Manufactures would classify as manufactures have been included as processed products. Commodities remaining in the Manufactures and Miscellaneous group are generally those subject to a considerable amount of fabrication. The most important net shipments in this group were of wooden furniture and building woodwork (millwork), and their importance is obviously related to the forest resource.

Imports

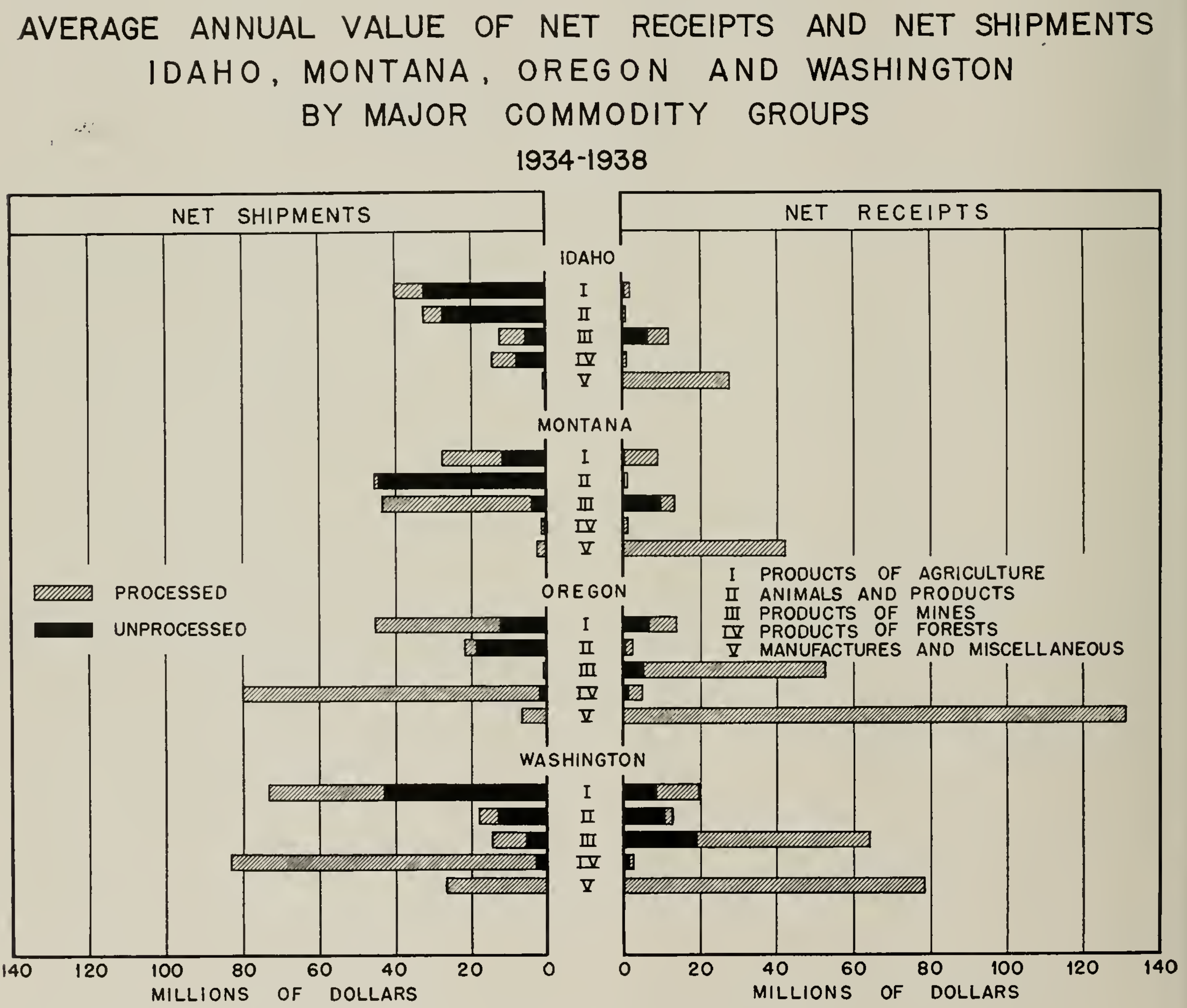
In its trade with other parts of the country, the Pacific Northwest receives manufactured articles primarily. The annual average value of net receipts of such articles from 1934 to 1938 was $265 million. The importance of motor transport is emphasized again in these data. The largest single subgroup is passenger automobiles, net receipts of which had an average value of $62 million. The annual value of beverages brought in is $24 million, while that of tobacco is $17 million. Net receipts of iron and steel products had an average value of $22 million, while tractors were valued at $12 million and agricultural implements at about $9 million. These are only the more important groupings. In the modern way of living, a great variety of manufactured goods is used. The people of the Pacific Northwest ship out the products of their land, forests, and mines to obtain these manufactured goods.

An indication of the size and direction of the invisible items in the external trade of the Pacific Northwest may be obtained from a comparison of the values of total net receipts and total net shipments. The average for the five years was $429 million and $517 million, respectively. The value of the goods shipped out each year appears to be approximately $90 million in excess of the value of the goods shipped in. This is characteristic of a region that is economically youthful, receiving services from, and paying its debts to, other parts of the country largely by shipment of commodities.

Intraregional Differences

The differences in the economic structures of the four States are revealed by the comparison of their external trade shown in table 8 and figure 46. For all the States, there were heavy net receipts of Group V, Manufactures and Miscellaneous. Idaho showed the smallest net shipments in this group and is the least industrialized of the four States; Washington, with average net shipments of $26 million, gives the greatest evidence of industrialization. Idaho is the most completely dependent on agriculture, and her farm products, both crop and animal, are shipped out largely in an unprocessed form. Animal products are much more important than crops to Montana, while the reverse is true of Oregon and Washington.

Forest products are of about equal importance in the external trade of Oregon and Washington, are much less significant to Idaho, and are quite minor in the trade of Montana. It is only for Montana that products of mines


AVERAGE ANNUAL VALUE OF NET RECEIPTS AND NET SHIPMENTS
IDAHO, MONTANA, OREGON AND WASHINGTON
BY MAJOR COMMODITY GROUPS
1934-1938

SOURCE: PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION, THE EXTERNAL TRADE OF THE PACIFIC NORTHWEST.

FIGURE 46

are of great importance as a source of net shipments. Montana is the only State in the region that produces gasoline, but production was less than consumption. This was reflected in small net receipts of gasoline and refined oils, which were outstanding items in the receipts of the other States, and were particularly large for Oregon and Washington.

TABLE 8.—*Average annual value of net receipts and net shipments for Idaho, Montana, Oregon, and Washington by major commodity groups, 1934 to 1938.*

[In millions of dollars]

Commodity group	Receipts			Shipments		
	Unprocessed	Processed	Total	Unprocessed	Processed	Total
Products of agriculture:						
Idaho	0.5	1.4	1.9	32.2	8.0	40.2
Montana	2.8	6.5	9.3	11.9	15.2	27.1
Oregon	7.0	7.9	14.9	12.2	32.9	45.1
Washington	8.6	11.5	20.1	42.9	30.6	73.5
Animals and products:						
Idaho	.2	.2	.4	27.0	5.1	32.1
Montana	.8	.4	1.2	44.6	.6	45.2
Oregon	.7	2.0	2.7	18.4	3.4	21.8
Washington	10.8	2.6	13.4	12.6	5.1	17.7
Products of mines:						
Idaho	6.5	5.7	12.2	5.7	7.1	12.8
Montana	9.6	4.2	13.8	4.1	39.0	43.1
Oregon	6.2	46.6	52.8	.1	.3	.4
Washington	19.0	45.6	64.6	5.2	9.1	14.3
Products of forests:						
Idaho	--------	.6	.6	7.6	5.7	13.3
Montana	.2	1.3	1.5	.5	.4	.9
Oregon	2.0	3.5	5.5	2.1	78.6	80.7
Washington	2.6	.5	3.1	3.0	80.3	83.3
Manufactures and miscellaneous:						
Idaho	--------	28.2	28.2	--------	.3	.3
Montana	--------	43.1	43.1	--------	2.1	2.1
Oregon	--------	128.0	128.0	--------	6.0	6.0
Washington	--------	78.6	78.6	--------	26.4	26.4
Total:						
Idaho	7.2	36.1	43.3	72.5	26.2	98.7
Montana	13.4	55.5	68.8	61.1	57.3	118.4
Oregon	15.9	188.0	203.8	32.8	121.2	153.9
Washington	41.0	138.8	179.8	63.7	151.5	215.1

An excess of receipts over shipments is expected only in very young or quite elderly economies. None of the Pacific Northwest States seems to fall into either of these categories. It is, therefore, surprising to discover that when total net receipts and net shipments are compared, Oregon, the first State to develop, has an excess of receipts over shipments, the ratio being 1.32. The other States have an excess of net shipments, the ratios of net receipts to net shipments being Washington .84, Montana .58, and Idaho .44.

The Transportation Problem

The transportation problem of the Pacific Northwest is made difficult by the vast land areas and the mountains that separate the region from the more populous sections of the country. This difficulty is accentuated by the nature of the goods interchange between the Pacific Northwest and other areas. The raw materials and partially processed products shipped out are bulky and of lower value per ton than the manufactured products that make up the larger part of the goods shipped in. Consequently, the tonnage of freight moving out of the region is much greater than the tonnage received. While the net shipments and net receipts do not show gross traffic movement on railroads, they do reveal the disparity between movement out and movement in. For the five-year period from 1934 to 1938, the net receipts totalled 9 million tons, and the net shipments totalled 14 million tons. For the railroads, this has meant a heavy eastbound tonnage and a light westbound tonnage and has regularly required the westward haul of large numbers of empty freight cars. Freight rates under those conditions are necessarily higher than would be needed if the movement were better balanced. The freight rate structure which has developed is one in which there are low eastbound commodity rates on such products as wheat and lumber, which form the major part of the freight movement to the east.

Economic Stability

A raw-materials economy is traditionally more unstable than a more highly industrialized economy. Furthermore, a region largely dependent on a single commodity is highly susceptible to changes in the market situation for that commodity. The excessive dependence of the Pacific Northwest on lumber products is a distinct source of weakness on both of these counts.

Lumber is a durable commodity and, as such, is extremely sensitive to changing business conditions. Boom conditions bring demands that the capacity of the industry is hardly able to meet. Depression results in disappearance of demand. Practically all lumber operations are forced to reduce their activities or to shut down entirely. The unhealthy condition of the basic industrial activity is communicated to the superstructure of service activities, and the whole economy of the region is adversely affected.

The great fluctuation in the number of persons employed in forest-products industries is graphically demonstrated in figure 44. According to the Census of Manufactures, the average number of wage earners in these industries was 72,550 in 1921, and 68,676 in 1933. Between these two dates, however, the total had risen to 126,688 in 1923 and 124,060 in 1929. From the low point in 1933, it rose to 119,455 in 1937. In addition to the variation in employment, there were wide changes in prices, which accentuated the effects on the regional economy of the rapid changes in the level of productive activity.

Agriculture, the other basic activity of the region, is subject to the hazards of weather and insect pests and is particularly subject to violent price fluctuations. For many agricultural commodities, the demand is quite inelastic, and supplies are largely dependent on weather conditions rather than on human decision. As a consequence, rate of production and employment may be fairly steady, but farm incomes fluctuate considerably and erratically. This is particularly true of specialized agriculture in which there is frequently exclusive dependence on one product. Individual growers, communities, or even large areas may at one time suffer low incomes because of small crops and low prices and at another time enjoy high incomes because of large crops associated with high prices.

Seasonal Fluctuations

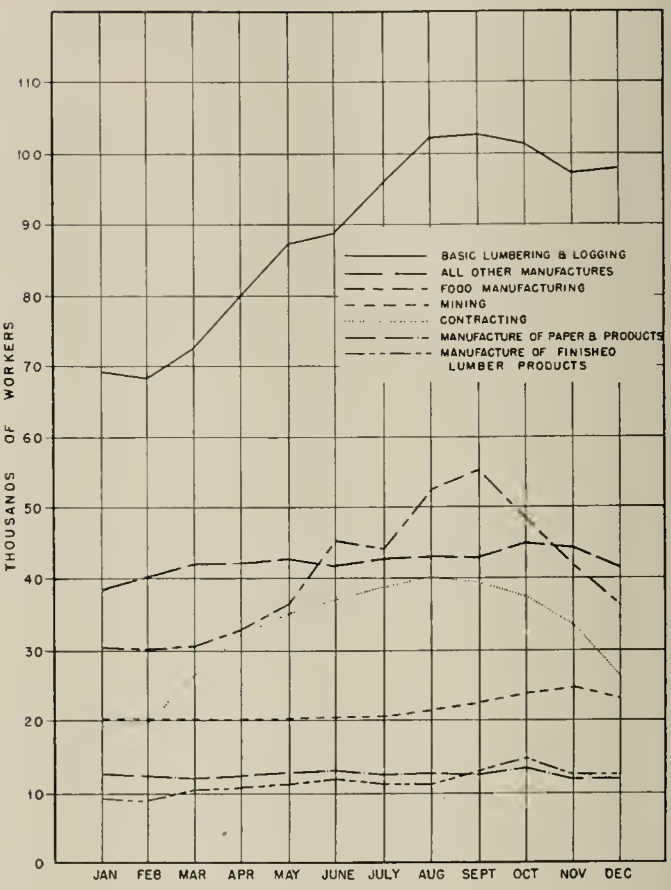
Seasonal activities are another source of economic instability. Workers engaged in such activities may be unemployed and without income for a considerable part of the year. In some cases, the occupation is also poorly paid, but even in occupations where earnings are relatively high during the season, standards of living are lower than would be possible under regular employment. The rhythm of employment and income is transmitted to retail and wholesale trade and to service occupations through fluctuations in consumption and need for credit. Where seasonal oscillations in employment are large, therefore, the adverse effects on the economy are serious.

Although many studies of seasonal variations in employment have been made, they do not provide the basis for an accurate comparison of the importance of seasonal fluctuations in different parts of the country. The relatively crude comparisons that are possible, however, indicate that seasonal unemployment is much more important in the economic life of this region than in the country as a whole. This is due to the great dependence on a small number of basic economic activities, most of which are strongly seasonal in character. Agriculture and lumbering, which provide the principal economic support of the region, and food processing, which ranks second among manufacturing activities, all have large and similar seasonal movements. This has been shown by studies of seasonal variations in employment in the Pacific Northwest relating to conditions in the early 1930's.[29] The most recent figures available show that these conditions still prevail. Illustrations in industry and trade may be found in data for 1939 obtained from the Unemployment Compensation Commissions of the Pacific Northwest States. In table 9 and figure 47 the number of covered workers in major manufacturing, trade, and service activities in the Pacific Northwest are shown by months for the year 1939.

COVERED WORKERS IN SELECTED INDUSTRIES

PACIFIC NORTHWEST

1939



SOURCE: UNEMPLOYMENT COMPENSATION COMMISSIONS OF IDAHO, MONTANA, OREGON AND WASHINGTON.

FIGURE 47

The improvement in business during 1939 tends to obscure the seasonal movement. When this is taken into account, the variations in employment are consistent with the types of seasonal movement that have been observed in the past. The high variability of important types of employment is apparent. Examples are: contracting, in which number of workers varied from 20 thousand in January and February to 40 thousand in August and September; food manufacturing, with 30 thousand workers in January, February, and March, and 55 thousand in September; basic lumbering and logging, with 69 thousand workers in January and February, and 102 thousand in August and September. It will be noted that the seasonal pattern is similar in all of these activities, with low levels of employment in the early months of the year and high levels in August and September. The severity of the seasonal swings is not fully

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[29] William S. Hopkins, *Seasonal Unemployment in the State of Washington*, University of Washington, 1936. Blair Stewart, *Seasonal Employment and Unemployment Compensation in Oregon*, Reed College, 1937.

TABLE 9.—*Pacific Northwest, covered workers in selected industries,*[1] *1939*

[Thousands of covered workers]

	January	February	March	April	May	June	July	August	September	October	November	December
Mining	20.3	20.1	20.2	20.0	20.2	20.2	20.2	21.2	22.2	23.9	21.1	23.5
Contracting	19.9	20.3	26.4	32.0	35.1	36.6	39.0	39.9	39.6	37.4	33.2	26.2
Food manufacturing	30.2	30.2	30.4	32.2	36.0	44.9	43.8	52.6	54.8	48.6	42.2	36.0
Basic lumbering and logging	69.3	68.7	72.3	79.9	86.8	88.3	95.3	102.0	102.5	101.4	97.2	97.6
Manufacture of finished lumber products	9.8	9.4	10.4	10.7	11.5	11.9	11.5	11.4	13.4	13.6	13.1	13.2
Manufacture of paper and products	12.2	12.0	11.9	12.2	12.4	12.5	12.1	12.4	12.3	12.7	12.6	12.8
All other manufactures	38.8	40.3	41.4	42.0	42.6	41.8	42.3	43.1	43.2	44.3	41.0	41.9
Wholesale and retail trade	148.5	145.7	150.4	158.2	156.6	163.1	161.7	166.2	174.5	176.2	171.2	177.3
Finance, insurance and real estate	16.5	16.6	16.7	17.5	17.8	17.9	17.9	17.9	17.9	17.7	17.5	17.6
Service	54.1	53.6	56.2	62.1	64.1	65.4	65.1	63.3	66.8	66.5	65.4	64.8
Grand total	419.7	416.8	436.3	466.8	483.1	502.7	508.7	530.0	547.1	542.3	523.4	504.9

[1] Transportation, communication, and utilities omitted because railroad workers came under Federal unemployment compensation in July 1939.

Source: Unemployment Compensation Commissions of Idaho, Montana, Oregon, and Washington.

evident from data for the four States combined. In individual States, or in important areas within States, the fluctuations are frequently greater than for the region as a whole.

Changes in total pay rolls, shown by major industry groupings and by quarters in table 10, also reflect the seasonal nature of much Pacific Northwest industry. Although to some extent obscured by quarterly grouping, the variation in pay rolls in the more seasonal industries is apparent.

Not all Pacific Northwest occupations are seasonal, and attention should be directed to those industries in which employment is relatively steady. In table 9 and figure 47, it may be seen that the manufacture of paper and paper products provides remarkably even employment throughout the year, while the number of workers in finance, insurance, and real estate is also quite constant. The grouping, "All Other Manufactures", provides reasonably steady employment, but there are distinct seasonal variations in wholesale and retail trade.

TABLE 10.—*Pacific Northwest payrolls in selected industries, 1939*[1]

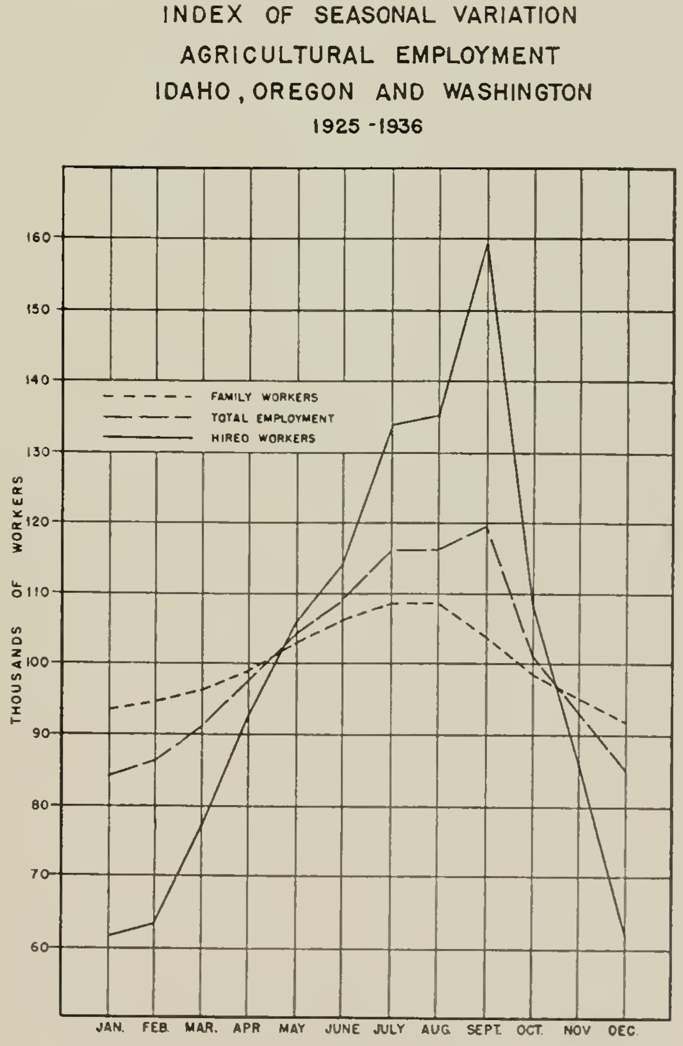
[Millions of dollars]

	First quarter	Second quarter	Third quarter	Fourth quarter
Mining	7.8	7.7	8.2	9.8
Contracting	7.7	13.0	14.3	12.6
Food manufacture	10.7	12.2	15.9	14.4
Basic lumbering and logging	25.1	31.5	34.8	34.3
Manufacture of finished lumber products	3.5	4.1	4.3	4.5
Manufacture of paper and products	4.5	4.9	4.9	5.3
All other manufactures	15.1	16.4	16.7	18.3
Wholesale and retail trade	48.2	52.5	55.5	61.2
Finance, insurance, and real estate	6.8	7.1	7.3	7.8
Service and miscellaneous	14.0	17.0	18.1	18.4
Total	143.3	166.6	179.9	186.5

[1] Transportation, communication, and utilities omitted because railroad workers came under Federal unemployment compensation in July 1939.

Source: Unemployment Compensation Commissions of Idaho, Montana, Oregon, and Washington.

Seasonal fluctuations in agricultural employment are also great and, unfortunately, have a pattern very similar to that in industry, thus reducing the opportunities for dovetailing of employment. For Idaho, Oregon, and Washington, the WPA National Research Project computed an index of seasonal variation in agricultural


INDEX OF SEASONAL VARIATION
AGRICULTURAL EMPLOYMENT
IDAHO, OREGON AND WASHINGTON
1925 - 1936

SOURCE: TRENDS IN EMPLOYMENT IN AGRICULTURE, WORKS PROGRESS ADMINISTRATION, NATIONAL RESEARCH PROJECT, REPORT NO. A-8, 1938, PAGE 73

FIGURE 48

employment from 1925–36. The results are shown in table 11. There was a moderate seasonal movement in the employment of family workers but drastic fluctuations in the employment of hired workers. The index for hired workers was 62 for December, 61 for January, and 63 for February, the low months of the year; it was 135 for July, 136 for August, and 159 for September, the high months. The variations are shown graphically in figure 48.

The standard of living of the population of the Pacific Northwest must be adversely affected by the instability of the basic industries. Means by which greater stability may be achieved are: (1) changes in methods of production designed to reduce seasonal peaks and fill in troughs, (2) an increase in the number and importance of more stable industries, (3) discovery and development of activities that make possible dovetailing with existing seasonal activities.

TABLE 11.—*Seasonal variation in agricultural employment in Idaho, Oregon, and Washington, 1925–36*

Month	Total employment	Family workers	Hired workers
January	84	93	61
February	86	94	63
March	91	96	77
April	97	99	93
May	104	103	106
June	109	106	114
July	116	109	135
August	116	109	136
September	120	104	159
October	101	99	108
November	93	95	86
December	84	92	62
Average	100	100	100

Source: *Trends in Employment in Agriculture*, Works Progress Administration, National Research Project, Report No. A-8, 1938. p. 73.

PART III

3. THE ECONOMY OF THE FUTURE

The Pacific Northwest has developed industrially by bringing one after another of its resources in quick succession up to a point little short of full utilization. Further development in agriculture and in the processing of agricultural commodities may be expected with confidence, but other resources can make a permanently enlarged contribution only if changes occur in the directions and methods of exploitation. The economy is unbalanced, with excessive dependence on forest products and agriculture, and is subject to excessively wide fluctuations, both seasonal and with changes in general business conditions.

Important alterations in the present situation may be brought about by the development of a new resource or by changes in the directions or methods of developing resources. Both of these possibilities will be considered.

Hydroelectric Power: A "New" Resource

The Pacific Northwest is relatively deficient in supplies of cheap fuels. Montana and Washington have the only large deposits of coal, and these are predominantly of low quality. The combined reserves of bituminous coal amount to about one percent of the national total, but these two States contain 14 percent of the subbituminous coal and one-third of the lignite.[30] Natural gas and oil have been discovered only in relatively small quantities. Consequently, wood and wood-wastes have been important fuels, and hydroelectric development has gone forward more rapidly than in other parts of the country. With only 3 percent of the national population, according to the Census of 1940, the Pacific Northwest had 14 percent of the national total capacity of installed water wheels.[31] Although hydroelectric development in the region was considerably above the national average, the undeveloped water power was very great. The estimated total output of existing water power plants at the end of 1937 was about 7,000 million kilowatt-hours per annum, but the estimated feasible additional output was at least 100,000 million kilowatt-hours, or nearly 15 times the output at that time.

Significant steps in the direction of making this tremendous resource available have been taken in building the Bonneville and Grand Coulee dams and in authorizing the construction of the Umatilla Dam. When generating equipment is fully installed at Bonneville and Grand Coulee, the total installed hydroelectric capacity in the region will have been increased by 75 percent. These two plants will have a total capacity of 2,462,400 kilowatts, and Umatilla will add another 420,000 kilowatts. If these new facilities are used at approximately half capacity, total output will be about 20,000 million kilowatt-hours per year. To the 7,000 million kilowatt-hours produced by plants in operation in 1937 would be added about 8,500 million kilowatt-hours from Grand Coulee, 2,300 million from Bonneville, and 1,800 million from Umatilla. Assuming that it requires a pound of coal to produce a kilowatt-hour of energy,[32] it would take 10 million tons of coal to produce this much electric energy. The total potential water power energy of the Pacific Northwest is the equivalent of 50 million tons of coal per year. This is roughly equal to the coal production of Illinois in 1937 and only a little less than half of the production in Pennsylvania.

Water power has one advantage over coal as a source of energy—it is inexhaustible. It does not, as does coal, become increasingly expensive to obtain as time goes on. The continuance of the resource can be counted on for generations.

It is true that the conversion of water power to electric energy requires expensive dams and generating plants and large outlays for transmission lines. The two large dams already built on the Columbia are parts of multiple-purpose projects, and difficult problems of allocation are involved in the attempt to determine the cost of electric energy. They were built during depression when the country was faced with severe unemployment. If the dams had not been constructed, it would have been necessary for governmental agencies to make larger outlays to take care of unemployed persons. When the social disadvantages of unemployment and relief are set against the advantages of constructive work, it is clear that the dams were a byproduct of a program to deal with the unemployment problem. While the initial installations of generating equipment were made prior to the present emergency, the installation schedule has been greatly accelerated by the defense program, and defense activities will require most of the power being produced now or in the near future.

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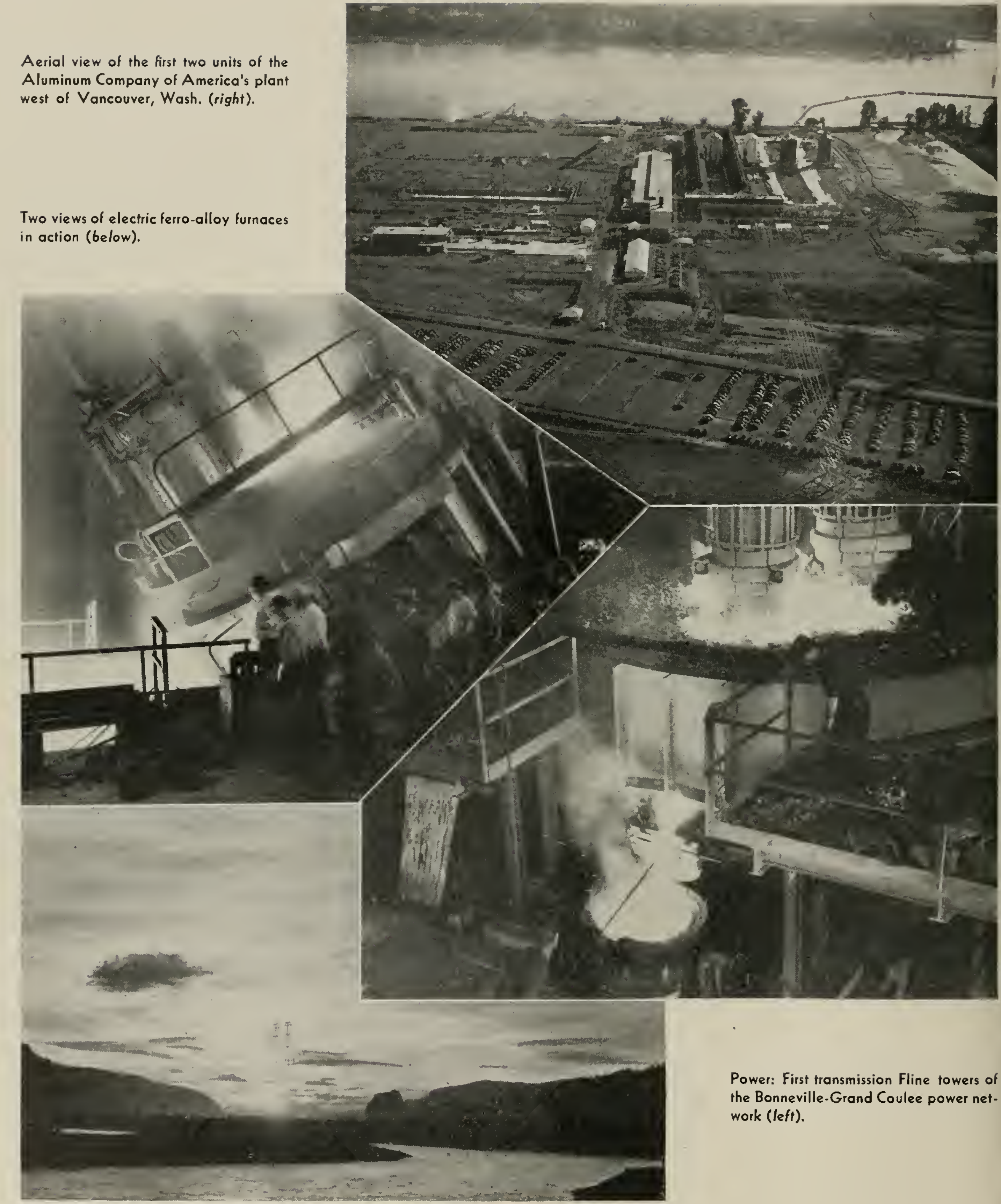
[30] National Resources Committee: *Energy Resources and National Policy*, p. 283.

[31] 1938 figures. *Energy Resources and National Policy*, National Resources Committee, January 1939, p. 241.

[32] Central Station use of coal in the United States in 1937 averaged 1.42 pounds per kilowatt hour, but efficiencies as high as .71 pounds per kilowatt-hour have been reached. *Ibid.*, p. 108.

Aerial view of the first two units of the Aluminum Company of America's plant west of Vancouver, Wash. (*right*).

Two views of electric ferro-alloy furnaces in action (*below*).



Power: First transmission Fline towers of the Bonneville-Grand Coulee power network (*left*).

Figure 49. The Industry of the Future.

Much of the generating equipment, therefore, could be charged to the defense program. Whatever the advantages of cost figures for accounting purposes, and whatever figures are selected, the actual social cost of these dams and generating plants has been very low. The social costs are determined by how much more of other goods or services people generally would have had if the plants had not been built. They could not have been great compared with the social contributions these facilities are capable of making.

Water power is the latest of the great natural resources of the Pacific Northwest to be exploited. The development of this resource is now going forward rapidly. Investment of Federal funds in it has been amply justified, and definite plans should be laid for further construction as it becomes desirable. It may be expected that in the post-war period, conditions will justify a great public works program which will be needed as part of the solution of the problem of adjustment. Undoubtedly, some further development of the water power and transmission system of the Pacific Northwest should be included in such a program.

Water Power and Defense [33]

The direction of economic development in the Pacific Northwest will be determined in large part by the uses to which its water resources are put. At the present time, these resources are being used very largely for defense, and the dedication of additional capacity to such purposes as it becomes available may be taken for granted.

To a considerable extent, the defense program has merely meant an acceleration of the processes by which the economic structure of the region is adjusting itself to the expanded exploitation of the power resource. Studies of the economic feasibility of new industries and plans for their development have rapidly borne fruit in the increased tempo of defense activities. On the other hand, the defense program will result in some activities or scales of operation that cannot be expected to continue after the emergency. It is nevertheless clear that the ways in which the generating facilities of Bonneville and Grand Coulee are now being utilized—and utilized as rapidly as they come into operation—will have profound effects on the future economic pattern of the region. It is important, therefore, to review these developments and consider their implications.

Electroprocess Industries

The most striking feature of recent industrial development in the region has been the establishment of new electroprocess industries. Prior to 1940, seven electroprocess plants were in operation in the Pacific Northwest: One copper and two zinc plants in Montana, a zinc plant in Idaho, and a copper refinery and two plants producing chlorine and caustic soda in Washington. Since the beginning of 1940, six new electroprocess plants have been established in the region, and additional products include aluminum, calcium carbide, ferrochrome, ferrosilicon, and chlorates. Information with respect to these six plants is presented in summary form in table 12. Five of the new industries obtain electric power from the Bonneville Power Administration and one from the Tacoma municipal system. In every case, they represent expansion of the activities of existing firms. For the most part, the companies involved are Eastern firms, only one being a Pacific Coast company.

TABLE 12.—*New northwest electroprocess plants established in Pacific Northwest in 1940 and 1941*

Name	Location	Products	Principal former operating area	Approximate plant investment [1]	Date power contract signed
Aluminum Company of America.	Vancouver, Wash.	Pig aluminum.	East	$10,000,000	12-23-39
Electro Metallurgical Co. (subsidiary of Union Carbide & Carbon Co.).	Portland, Oreg.	Calcium carbide and ferroalloys.	do	2,500,000	5-29-41
Ohio Ferro-Alloys Co.[2]	Tacoma, Wash.	Ferroalloys	do	250,000	1941
Pacific Carbide & Alloys Co.	Portland, Oreg.	Calcium carbide.	Calif	250,000	7-13-40
Pennsylvania Salt Co.	do	Chlorates	East	400,000	12-18-40
Reynolds Metals Co.	Longview, Wash.	Pig aluminum.	South	5,000,000	2-24-41

[1] As reported in the press.
[2] Customer of Tacoma Department of Public Utilities.

With the exception of aluminum, the electroprocess industries that have been established in the Pacific Northwest in recent months give promise of peacetime operations at approximately the present or immediately contemplated scale.

At the present time (June 1941), the Bonneville Administration has contracts outstandings for 325,855 kilowatts. Of this, 56,355 kilowatts are being sold wholesale to municipalities, private utilities, or public-utility districts for resale. Of the remainder, 90 percent is now being taken or is under contract for the production of pig aluminum. The remaining power now being sold is being used for shipbuilding and the production of calcium carbide. There are contracts for chemical production and electrometallurgical operations, as shown in table 12.

If proportionate allocations to different industries are maintained in the utilization of the power that will be available in the very near future, it will mean that the Pacific Northwest will become a tremendous producer of pig aluminum. The production now contemplated will be 225 million pounds of aluminum per annum. This is equal to total production in the United States in 1936 and is 25 percent of the national production as scheduled under the defense program on January 1, 1941. If, as seems quite possible, additional aluminum ingot plants are constructed in the Pacific Northwest, capacity in this region may be as much as twice the national predefense production.[34] Such a scale of production can be maintained after the emergency only if there is a great increase in peacetime consumption—presumably with lower prices for aluminum.

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[33] Much of the basic information for this section was supplied by the Market Development Section of the Bonneville Power Administration.

If the Pacific Northwest is well situated for aluminum production, a continuance of the industry after the emergency—but possibly on a reduced scale—is to be expected. The importance of cheap power in aluminum production seems to be sufficiently great to assure this. If, in addition, plants for further processing and manufacturing of aluminum and aluminum products are erected, a permanent addition to the economy of the region may be made.

There is a further possibility that magnesium production may be started under the defense program. Since there are very large deposits of magnesium-bearing ores in the Pacific Northwest, magnesium production may prove to be well adapted to the area. The combination of aluminum and magnesium production presents the prospect that an important light-metals segment may be added to the economy of the Pacific Northwest.

Aircraft production has been established in the Pacific Northwest for some years but has been greatly stimulated by the war program. While airplane manufacture requires heavy use of aluminum, there has been no integration of the Pacific Northwest aluminum and aircraft industries. The pig aluminum is shipped east for rolling and other fabrication, and the aluminum products are then shipped west again to be used in plane construction. If fabrication of aluminum and other light metals is developed, the continuance of aircraft production in the Pacific Northwest beyond the war emergency seems assured, although reduction in the scale of activity may be quite probable.

During the war of 1914–1918, an important shipbuilding industry developed in the region. This experience is being repeated. At its wartime peak, shipbuilding in Washington and Oregon probably employed 70,000 workers, but by 1921 this number had declined to a few hundred. In part, the decline was due to the abandonment of wooden shipbuilding, which had been adopted as an emergency expedient. The curtailment of steel shipbuilding coincided with the general slump in ship construction that followed the heavy building of the war and immediate post-war periods. In the Pacific Northwest, however, the decline went almost to the point of extinction. One important cause for this situation was the high cost of iron and steel in this region, which reflects the relatively small scale of iron and steel operations on the Pacific Coast. This condition might be modified if iron and steel plants were erected in the Pacific Northwest as a part of the war program. Such plants are under consideration but are not in process of establishment. This is not the place to consider in detail their feasibility, either for defense or for permanent operation. Studies that have been made have concluded that additional iron and steel capacity is feasible in the Pacific Northwest.[35]

Production of ferro-alloys seems to have a permanent future in the Pacific Northwest. Many of the necessary materials, as well as the power, are present or could readily be made available. Considerable further expansion could take place under the war program, or otherwise, without reaching the economic limit for permanent operations. This is also true of other electrometallurgical industries.[36]

Expansion of electrochemical industries is also under way. There are indications that low power costs and the availability of raw materials will provide a permanent basis for an important chemical industry. Manufacture of calcium carbide and chlorates is already consuming Bonneville power. Phosphate production would make possible the utilization of some of the tremendous deposits of phosphate rock found in Idaho and Montana. Other electrochemical industries are undoubtedly feasible.

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[34] After this was written the Office of Production Management announced that Government-owned plants would be constructed with capacities totalling 600,000,000 pounds of aluminum annually. Three plants with a combined capacity of 180,000,000 pounds are to be located in the Pacific Northwest. When these plants are in operation the total capacity in this region will be 405,000,000 pounds. This may be compared with the following figures (in million pounds) for total production in the United States: 1935, 119; 1936, 225; 1937, 293; 1938, 287; 1939, 327. Source, *Mineral Yearbook,* 1940, United States Department of the Interior, Bureau of Mines.

[35] *Report on the Feasibility of Iron and Steel Production in the Northwest Using Columbia River Hydroelectric Power,* United States Department of the Interior, Bonneville Project. Market Development Section, 1939.

Edwin T. Hodge. *Report on Available Raw Materials for a Pacific Coast Iron Industry,* War Department, Corps of Engineers, U. S. Army, Office of the Division Engineer. North Pacific Division, 4 vols.

Raymond M. Miller, *An Investigation of the Feasibility of a Steel Plant in the Lower Columbia River Area Near Portland, Ore.,* State of Oregon, Department of Geology and Mineral Industries, 1938.

[36] For an extensive discussion of possible defense industries in the Pacific Northwest, see *Industries Important to National Defense Feasible of Establishment in the Pacific Northwest,* United States Department of the Interior. Bonneville Power Administration, Market Development Section, July 1940. A very useful summary, *Principal National Defense Industries Feasible and Under Consideration for Location in the Pacific Northwest,* was issued by the same agency on June 9, 1941.

Problems of Expansion

Although the Pacific Northwest may be an economically desirable location for a number of electrometallurgical and electrochemical industries, their rapid expansion is subject to important restraints. Fairly large amounts of capital are necessary to establish most electroprocess plants. In table 12, the cost of the plants involved was from $250,000 to $10,000,000. The Bonneville Power Administration has estimated typical plant investments for some of the electroprocess industries not listed in table 12 as follows:[37]

Electrolytic chromium	$2,000,000
Electrolytic manganese	3,000,000
Electrolytic zinc	3,000,000 to 4,000,000
Magnesium	9,000,000
Synthetic nitrogen	5,000,000
Chlorine	500,000

These are sums that very few individuals would be able to invest, and that a new firm would find hard to raise by sale of securities.

Aside from the amount of capital necessary, the market situation undoubtedly acts as a restraint on possible new enterprises. The production of important electroprocess products is concentrated in a few companies. Before the developments under the defense program, the number of different companies producing the following products was:[38]

Aluminum	1	Beryllium	3
Magnesium	1	Electrolytic zinc	3
Abrasives (silicon carbide and fused alumina)	3	Ferrochromium	4
Ferromanganese	8	Electrolytic copper	6
Cadmium	9	Calcium carbide	7
		Ferrosilicon	8

In all of these industries, either monopoly or monopolistic competition exists, and new enterprises are restrained from entering by visions of the actions of existing firms. Related restraints are those arising from patents and secret processes. Many important electroprocesses are controlled by patents held by existing producers. The technical knowledge necessary is also frequently highly specialized and almost entirely confined to the staffs of companies now operating. These difficulties, which new firms cannot easily surmount, act as protective barriers for the price and profit structures of existing companies against potential competition, even though favorable geographic locations are available to prospective competitors.

In the defense program, the stimulus to industrial activity so far (1941) has been almost entirely confined to the Puget Sound and lower Columbia River districts. For military reasons the location of more defense activities further inland is highly desirable. Availability of electric power and proximity to raw materials such as those involved in magnesium, aluminum, and phosphate fertilizer production provide economic justification for interior location in a number of cases. These possibilities should be given full weight in any consideration of the location of such industries.

National needs are of first importance in prosecuting a war. In determining what role the Pacific Northwest should play, the maximum contribution from the region is the first outcome to be sought. An outstanding cause of the importance of this area in the war program is the existence here of great present and potential electric power—a new resource is being developed at a crucial time. In considering how this and the other resources of the Pacific Northwest can be used to the national advantage, it is not out of place to take into account the probable effects on the economy of the region after the present emergency is over. Further expansion of many electrochemical and electrometallurgical industries could take place with excellent prospects of continued operation. Expansion of pig aluminum production and shipbuilding beyond present levels would result in a total capacity so large that continued full-scale operation under peacetime conditions would be highly improbable.

Research: The Means to Better Utilization of Resources

The history and present economic structure of the Pacific Northwest emphasize the basic importance of agricultural land and forests. The scale on which the expansion of electric power production is taking place is so great that it has been treated as a new resource capable of contributing greatly to the strength and stability of the economic life of the region. While low-cost power may be combined with minerals in important new activities, its application to the industrial use of agricultural and forest products offers even more far-reaching possibilities. Research—which is now being recognized as an important resource—is the additional ingredient necessary if such possibilities are to be realized.

The importance of industrial research has been emphasized in a recent publication of the National Resources Planning Board.[39] Such research—both technological and economic—is critically needed now to develop in advance ways to meet the shift from armament to peace production without a disastrous slump. Research is one of the most important dynamic factors in modern economic life, contributing new products, improved quality, and greater labor and capital productivity. Effectively applied to the problems of the Pacific Northwest, it should contribute greatly to the desired increase in the productivity and stability of the economy. At the present time, however, research is being applied to the industrial problems of the region only to a very minor degree. Of the 44,292 workers in industrial research reported to the National Research Council in 1938, only 108 were employed in laboratories situated in the Pacific Northwest.[40] They were distributed between industries as follows:

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[37] *Industries Important to National Defense Feasible of Establishment in the Pacific Northwest.*

[38] Source: For aluminum, magnesium, abrasives, beryllium, electrolytic zinc, electrolytic copper, calcium carbide, and cadmium, Federal Power Commission, *Power Requirements in Electrochemical, Electrometallurgical, and Allied Industries*, 1938; for ferrochromium, ferromanganese, and ferrosilicon, Bonneville Power Administration, Market Development Section, *Industries Important to National Defense Feasible of Establishment in the Pacific Northwest*, 1940.

[39] Research—*A National Resource II, Industrial Research*, 1941.

Nonferrous metals	29
Chemicals and allied products	28
Food and kindred products	17
Forest products	9
Stone, clay, and glass products	5
Consulting and testing laboratories	11
Trade associations	6
Miscellaneous	3

Information on the number of persons engaged in industrial research does not indicate with any exactness the amount of industrial research work that may have a bearing on industrial developments in the region. Research may bear fruit here, no matter where it is done, if it develops uses for the resources of the area and is available to those interested in the industrial utilization of such resources. The smallness of the personnel engaged in industrial research here, however, may be taken as an indication that major research activities are being carried on in fields other than those of most importance to the Pacific Northwest, and by interests whose principal activities are carried on in other areas.

While important research work is being done on industrial utilization of agricultural and forest products, it is very small compared with that being carried out in other fields. It has been estimated that the agricultural implement industry (including tractors) in 1937 spent $2.90 on industrial research for each $100 of value added by manufacture.[41] The corresponding figure for rubber products was $2.73. These two industries are located almost entirely in other areas. The third industry by this measure was chemical and allied products, in which $2.38 was spent on industrial research for each $100 of value added. It is probable that a minor portion of this research had a bearing on the use of Pacific Northwest mineral, agricultural, and forest products. Considerably further down the list come industries of greater importance in this area. The amount spent in nonferrous metals and their products was $0.62 per $100 value added by manufacture; in paper and allied products, $0.39; in food and kindred products, $0.19; and in forest products, $0.07.

Government Research

Research carried on under Government and university auspices is probably of greater relative importance in fields that are of significance for the Northwest. The research work of many Government bureaus is relevant, but the two fields of activity that seem to be most directly related to the industrial development of the region are those of the Western Regional Research Laboratory at Albany, Calif., and the Forest Products Laboratory at Madison, Wis. The former is concerned with industrial utilization of wastes and surpluses of farm products produced in the Pacific Northwest and in other western States, also with research on these products when grown for food purposes. The latter is engaged in industrial research on forest products generally. At a number of the universities in the region, effective industrial research is being carried on involving the minerals, as well as the agricultural and forest products. A significant recent development was the appropriation by the Washington State Legislature of $150,000 to be available over a 2-year period for industrial research projects recommended by the Washington State Planning Council.

Private Research

There are indications that the importance of industrial research is becoming more fully recognized by private business concerns engaged in forest products industries. Two of the most rapidly expanding fields are plywood production and pulp and paper production, and in both cases industrial research has been an important factor in the expansion. The relatively small size of most of the corporations in forest products industries, however, renders unlikely research activity on a scale comparable to that in industries such as farm implements, chemicals, and rubber, where such pronounced advances have been made in recent years. Although many small and medium-size corporations are engaging in research work, it is an activity in which the large corporation has considerable advantages. The national research project found that the number of enterprises with more than 50 research employees increased from 44 in 1927 to 120 in 1938, the total personnel in such laboratories increasing from 11,200 to 28,700 in the same period. This meant that the proportion of the total research personnel reported by firms with large laboratories had increased from 59 to 65 percent of the total.[42] In forest products industries, not including paper and allied products, 17 companies reported a total of 192 employees in 1938, or an average of slightly more than 11 employees per laboratory.[43] In paper and allied products, where the scale of operation is undoubtedly larger, there were 57 companies with a total of 752 research employees, an average of slightly more than 13 research workers per company.[44] The relatively small degree of concentration in the forest products industries is socially desirable for other reasons, but it does mean that industrial research on a scale comparable with that in other industries is not to be expected if major dependence is placed on private enterprises.

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[40] George Perazich and Philip M. Field, *Industrial Research and Changing Technology*, Work Projects Administration, National Research Project, Report No. M–4, January 1940, pp. 69–72.

[41] Research—A National Resource II. Industrial Research, p. 122.

A similar situation exists in food and kindred products industries, the industrial field of most direct importance for agriculture. While the research personnel in this field is larger than in forest products—totalling 1,424 in 1938—there were only 13 research employees per company. It would be surprising if industrial innovation in the fields of primary importance to the Pacific Northwest were not at a slower rate than in chemicals and allied products, where there were 9,542 research employees in 1938, or 24 per company; in petroleum and its products where 53 companies had 5,033 research workers, or 95 per laboratory; or in electrical communication, where 4 companies employed 4,202 persons in their research laboratories.[45]

Expansion of Research

Efficient combination of the hydroelectric resource with the other resources of the region can be achieved only if there is great expansion in industrial research activities. All possible agencies should contribute to this result, private enterprises, trade associations, research foundations, universities, and Government laboratories. Present experience seems to indicate that in most instances the greatest difficulties are encountered when an attempt is made to push beyond the stage of initial scientific discovery into pilot plant operation and on into commercial development. This is particularly true of universities and Government laboratories. It is quite possible that the greatest immediate advance could be made by emphasis on means by which developments that have already been carried through the laboratory stage could be pushed on to the point of demonstrated commercial feasibility. A first step is the expansion of pilot plant operations at existing laboratories. This should be done for all laboratories supported by public funds and should be given serious consideration by trade association and research foundation laboratories.

A second step is to provide Government assistance, and even initiative in promoting commercial development. The position taken by the Federal Government in retaining the ownership of major hydroelectric sites, and in generating and marketing electric energy, has made it responsible for the use of power in ways that will be socially most advantageous to the region and the Nation. This responsibility is not discharged by the discovery of new products or techniques if no steps are taken to see that use is actually made of the discoveries. An appropriate means to provide for this is by enlarging the scope of the Bonneville Power Administration, the agency through which the federally generated electricity is being marketed. If it is to fulfill its obligations, the Bonneville Power Administration must be given greater authority and funds for research, pilot plant, and commercial-scale experiment, and be empowered to collaborate with other agencies, both public and private, in efforts to realize the full potentialities of the combination of the tremendous quantities of low-cost power with other resources.

The field of commercial-scale demonstration of industrial processes is not an entirely new one for the Federal Government. The Tennessee Valley Authority in particular has shown that it is possible for the Government to make significant contributions in this direction. Successful commercial development calls not only for solutions to the technical problems of production but also to those of marketing and of financing the enterprise. Agricultural and timber cooperative associations are agencies with which the Government might properly cooperate in attempts to solve these problems. Considerable experience has been acquired, especially in the agricultural field, and this should be drawn upon by the responsible governmental agencies.

Toward a More Stable Economy

The objective of planning in the Pacific Northwest is a better and more stable plane of living for the people of the area. Greater population is desirable only if living is better here than elsewhere, and migration thus contributes to national well-being. A better economic pattern, more stable and more permanent, is essential if the proper objectives of planning are to be achieved. In this better pattern, greater productivity and stability for agriculture is of equal importance with the improvement of industry. Herbert Heaton has described, in the following words, a common tendency in public policy to prefer industrial to agricultural expansion:

> The encouragement of industrialism has figured largely in the politics of most countries. The motive the belief that it was

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[42] George Perazich and Philip M. Field, *op. cit.*, pp. 42 and 66.

[43] *Op. cit.*, p. 73.

[44] *Ibid.*

[45] *Ibid.*

derogatory, disgraceful, and dangerous to remain a Nation of farmers and handicraftsmen; dangerous because the handicrafts would be destroyed by the competition of imported machine products, because there would be no openings for those whose inclinations and talents were not rural, and because the Nation could not make its own war equipment; derogatory because the standards of the nineteenth century seemed to place the townsman on a higher plane than the rustic, and the man who lived near the factory chimney above the hewer of wood, the shepherd, and the cultivator; disgraceful because it was shameful to depend on others for goods that one could and should make for oneself. If China, Japan, and India were to count in the eyes of the western world they must modernize their industrial equipment as well as their judicial and educational systems; if Canada, Australia, and even the United States were to emerge from colonial status or stature they must cut the ties that bound them to the factories of Lancashire, Yorkshire, and the Black Country; if new or reborn nations, such as Germany or Italy, were to make their unity or freedom real they must translate nationalism into factories, mines, banks, and statistics of industrial output; and if Russian Communists wished to justify their faith and place in a hostile capitalistic world they must teach a nation of peasants how to make electricity, tractors, cloth, electric lamps, and cheap matches.

In part II of this report consideration was given to the means by which agricultural land could be more effectively utilized. Part III has attempted to discover the ways in which industrial activity can contribute more largely to economic health. An objective of the whole report is a better and more stable agriculture, balanced by a better and more stable industry.

At the present moment, the war program is reshaping the industrial organization of the Pacific Northwest. Many activities started under the necessities of the moment will be permanent features in the economy of the future. Others will disappear or be greatly reduced. Research—industrial research particularly—should be directed toward the prompt readjustment of organization, plant, and output to post-emergency needs. Consideration must be given to means by which contingencies can be met with a minimum of social costs.

PART III

4. FINDINGS AND RECOMMENDATIONS

Findings

From the beginning of settlement, the economy of the Pacific Northwest has been primarily extractive in nature, producing raw materials or slightly processed products. Industrial development has been determined by the nature of the resources available for exploitation by the methods and under the conditions prevailing at the time. Fur-bearing animals, minerals, fish, agricultural lands, and forests have been successively emphasized. In each case, problems arising from depletion of the resource have been encountered. There is little prospect for expansion under the old methods of exploitation and serious danger that the industrial base may be cut away by resource depletion.

Because of location remote from densely populated areas, transportation costs have had an important bearing on industrial activity. It has been necessary to concentrate on resources rich enough—and to exploit them with an efficiency great enough—to pay the freight costs involved in selling in distant markets. Manufactured goods shipped into the region are sold at prices that include heavy transportation charges.

Agriculture and forest products industries are the main supports of the industrial structure. The economy is affected by the fact that both of these supports are unstable; with wide fluctuations in production and prices, and thus in income, and with large seasonal variations in employment.

In the regional industrial structure, there are some marked deficiencies—in extent of processing of materials produced, in fabrication of metals, in integration of related industries, in diversity of activity, for example—that should be filled in the interest of stronger regional and national economies. There are also structural weaknesses in the distribution of industry within the region—in relation to geographic areas, natural resources, and population—that should be strengthened.

The greatest remaining resource of the Pacific Northwest, the potentiality for hydroelectric power production, is in a relatively early stage of exploitation. Rapid development of this resource is taking place under the auspices of the Federal Government. The Government, therefore, has an important responsibility for the use to which the power is put and the results to be obtained from that use. Nevertheless, other agencies, public and private, must contribute what they can to the end that the widest and greatest social benefit shall be obtained from this vast supply of electric energy.

The large available supplies of electric power have been the basis for the development of pig aluminum production and for great expansion under the impetus of the defense program. Other electro-metallurgical and electrochemical industries are developing, and considerable growth in these fields seems certain.

Pig aluminum production and aircraft and ship building are principal activities to which the defense program has given tremendous impetus. It is likely that the full scale of production reached in such fields cannot be sustained under peacetime conditions and that serious problems of readjustment will be encountered.

The great changes in industrial technology that have come in recent years as the result of industrial research indicate that new and more effective methods of using resources, particularly electric power and the products of forests, farms, and mines, can be found, and that these new techniques are the foundation on which an altered industrial structure can be built. If greater productivity can be combined with increased stability, industry can contribute greatly to better living conditions for a larger population. If, in addition, the drain on forests and agricultural land can be balanced by growth and replenishment of fertility, the permanence of the industrial base can be assured.

Recommendations [46]

In order to enhance the stability, strength, and durability of the industrial base of the region, it is recommended:

1. That the broad program of legislative and administrative action necessary to establish sustained-yield management of forest resources be pushed forward as rapidly as possible.

2. That efforts to conserve the soil resource as basis for industrial activity be expanded and intensified. Soil conservation and maintenance of soil fertility should be accompanied by continued efforts to eliminate wastes and to achieve more effective processing and manufacturing of agricultural products.

3. That all agencies, Federal, State, and private, increase their efforts to conserve and increase the fisheries resource, and that more adequate provision be made for the essential work of international and interstate fisheries commissions.

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[46] See also *Migration and the Development of Economic Opportunity in the Pacific Northwest*, Pacific Northwest Regional Planning Commission, 1939; and Part I, of this report.

4. That increased efforts be made to locate and measure mineral resources, to promote their effective and conservative use, to eliminate waste, and to develop production of essential minerals, through small as well as large enterprises. In this program, attention should be given to iron and steel production as well as to light metals and fertilizer.

5. That increased and more concerted effort be made to lower existing barriers—in finance, management, technology, transportation, distribution, and marketing—and to broaden and strengthen industrial activity. It is believed that this effort may require the stimulation and guidance of a council representative of governmental, technical, and industrial interests of the region.

6. That greater efforts be made to stimulate, to carry forward, and to coordinate research on Pacific Northwest economic and industrial problems, and that special attention be given at this time—both in general research and in research within individual industries—to studies looking toward quick and orderly adjustment of production to a post-war economy. These activities would call for increased effort by agencies at present cooperating in this field and by other agencies and groups concerned; a council of the kind referred to in the preceding recommendation would be helpful in stimulating, guiding, and utilizing such research.

7. That the Bonneville Power Administration be given the authority and the financial means to engage in experimental work, including pilot plant and other demonstration operations in industrial and power-use fields, and otherwise to take a leading part in stimulating and coordinating industrial research, in conjunction with cooperatives and similar organizations, and small as well as large industries.

8. That greater support be given, and every effort made to stimulate industrial research related to forest products and the use of waste materials on the part of the Forest Products Laboratory, of colleges and universities, of research foundations, of trade associations, and of private companies.

9. That arrangements be made (including such measures as a regional advisory committee) to increase knowledge in the Pacific Northwest of the work of the Forest Products Laboratory and to bring the problems of this region more emphatically to the attention of the Laboratory. These measures are suggested as a possible substitute for the establishment of a branch forest products laboratory in the Pacific Northwest.

10. That the Western Regional Agricultural Research Laboratory, and other appropriate agencies, including colleges and universities, research foundations, trade associations, and private enterprises, increase the volume of industrial research done on industrial utilization of agricultural products.

11. That the geological departments of the States, the United States Geological Survey, and the United States Bureau of Mines, in cooperation with the Bonneville Power Administration, increase the scope and intensiveness of their studies of mineral occurrences and utilization.

12. That appropriate agencies increase the research work being done on the economic problems related to industrial location and distribution in the Pacific Northwest.

13. That regional and areal planning, with a sound land-planning basis, be carried out by regions, States, and localities (particularly metropolitan areas), with the aims of establishing improved industrial and settlement patterns that will afford opportunities and advantages for good and healthful living, as well as economical industrial sites properly related to resources, and to facilities for transportation, distribution, and marketing.

PART IV

A PLAN AND PROGRAM FOR REGIONAL DEVELOPMENT AND IMPROVEMENTS

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NATIONAL RESOURCES PLANNING BOARD

Acknowledgment

This report is a brief composite of the development policies and programs formulated by the people of the region and the various agencies that serve them. No one group—least of all the Regional Planning Commission (which has reviewed and sponsored the report) or the staff (which has drafted it)—would presume to claim this framework of a plan and program as its own creation. The broad view intended to be presented could result only from a continuing contribution—on the part of the many Federal and State agencies and public-minded bodies and individuals concerned—to the knowledge of the region's resources and to clarification of its aims. Grateful acknowledgment is made of long-term cooperation with the Regional Planning Commission of associated committees and advisors, as well as of immediate assistance of agencies and individuals in furnishing criticism and advice, information as to plans and projects, and other data. It is regretted that the great amount and wide range of assistance received precludes specific mention here of those to whom sincere thanks are due.

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[1] Until July 1941.

PART IV
FOREWORD

Part IV of this report presents a general plan and program for the development of the Pacific Northwest. The framework of a regional development plan included herein is the second such presentation,[1] but the program outlined is the first presentation of an over-all view of development programs and of a reservoir of internal improvement projects for the region. Since machinery and procedures have not been available for the complete assembly of public works and improvements contemplated at all levels of government, the current survey has been largely of a reconnaissance character. Many important programs have been indicated only in very general terms, and unquestionably, many desirable projects have been omitted. It is still more difficult, particularly in a pioneer report, to present anything like a comprehensive view of the nongovernmental programs that are so essential to regional development.

The basic object of this presentation is to encourage the people of the region to take stock of what resources are available, and realistically to determine how these resources can best be used in promoting the welfare and security of the people who are dependent upon them. More specifically, it is intended to present a basis for the consideration of the problem of general development and stabilization of employment in the region; to present a plan and program of works and activities looking toward the expansion of economic opportunity in the region, toward meeting the immediate needs of the present war period, and finally, toward the provision of a needed reservoir of work and improvements for the post-emergency era of readjustment and reconstruction.

The National Resources Planning Board has presented to the President and the Congress a series of reports on the development of resources and the stabilization of employment in the United States.[2] The Board's study covers a program for national development, including the programs of Federal agencies, development plans for each major region in the country, and functional plans and policies for the development of land, water, and energy resources. The Board has presented its reports on these studies with due recognition of several fundamentals: that "our economic system is one of joint private and public activity"; that "the provision of certain basic facilities is an appropriate public function"; and that as a Nation we are confronted with the problem of planning for the "conservation and better utilization of our resources, for needed public facilities, and also for the productive employment of our resources in human skills and energies."

In addition, the Board has recognized that total national defense includes the "development of a strong, vigorous, and healthy national economy," and, in a broader sense, "the preparation for post-emergency adjustments." As part of the solution to the problem of adjustment, the Board suggested a national reservoir of public construction projects,[3] and, to make that pool quickly available in time of need, provision for carrying forward, in advance, the surveys, investigations, and plans for selected projects.

This Pacific Northwest plan and program is intended as a regional counterpart to the series of national reports described above. It should not be considered as the plan and program of the Regional Planning Commission. This advisory planning agency has not presumed to take the role of master architect for the development of the region. It has attempted to report relevant facts and to draw together and to harmonize the various plans developed or under development by the people of the region and by the technical agencies that serve them.

The framework of a plan and program—rather than a plan and program—is presented. The complete regional plan and program is a concept as yet far from attainable. Such a plan would have to be a synthesis of a great many individual plans and programs—of Federal departments, of States and their subdivisions, and of civic, corporate, and private interests. Many of these plans and programs are nonexistent, and all could not be secured and combined in a single, widely understandable scheme. Effort has been made to include the broader essentials of the larger plans and to weave them into a relatively simple statement of objectives for the region; of major problems; of outstanding needs in policy, programs, and organization; and of known projects and types of projects that will tend to further the broad and progressive development of the region.

In erecting the framework of a regional plan, it has not been necessary to draw heavily on imagination.

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[1] *Framework of a Regional Development Plan*, Pacific Northwest Regional Planning Commission, 1910; *Development of Resources and Stabilization of Employment in the United States*, Part II, National Resources Planning Board, 1941.

[2] *Development of Resources and Stabilization of Employment in the United States*, National Resources Planning Board, 1941.

[3] The Public Work Reserve has been organized in the Federal Works Agency to assist in meeting the need for such a reservoir; the National Resources Planning Board, as cosponsor, functions in an advisory capacity in the project.

Tangible, strong elements of the plan have been prepared—in the water, land, energy, and human resources fields, and for subregional areas—by such Federal agencies as the Corps of Engineers, Bureau of Reclamation, Bureau of Agricultural Economics, Forest Service, Soil Conservation Service, Farm Security Administration. Grazing Service, Fish and Wildlife Service, Park Service, Oregon and California Revested Lands Administration, and Bonneville Power Administration, and by various State and local planning and technical agencies. Supporting data for these elements of a plan have been provided through the investigations and research of a considerable number of governmental, industrial, and civic groups.

For various reasons, it is desirable again to present the substance of the plan framework: The plan is not static: it should be critically and constructively reviewed and revised from time to time. Benefit has already been had of a number of suggestions received as a result of its first publication. Finally, it is not desirable to consider a program of works apart from the basic objectives and plans; without concurrent consideration of the larger economic and social causes and effects, lists of programs and projects lack reality and coherence.

In assembling the first regional works program outlined herein, advantage has been taken of previous studies. Project lists have been drawn most largely from the reports of the Pacific Northwest drainage basin committee,[4] the 6-year public works programs of Federal agencies, the 6-year capital improvement programs recently developed by the States of the region,[5] and reconnaissance studies of the types of public improvements planned or needed in representative municipalities and metropolitan and rural areas. Yet it must be reiterated that this works program or reservoir is far from complete. It must be expanded, built up, improved—particularly by the addition of improvements designed to meet existing and emerging community, industrial, and service needs.

The formation and use of a reservoir of needed and desirable improvements for the post-emergency period, and for a long-range construction program generally, must be approached with a high degree of vision and realism combined. It is known that, on the slackening of the unprecedented war effort, construction resources—essential plant, machines, science, technology, and labor—will be available in large quantities. We know also that radical and large scale reconstruction is overdue for many kinds of public and quasi-public improvements, affecting highways, parking, transport and terminals, blighted areas, housing, parks, sanitation, and power, and that this reconstruction should be planned on an integrated community and regional basis. Ways and means must be imaginatively, realistically, and directly sought to bring these two fundamental factors together. It is unthinkable that these very real instruments for the production of wealth and better living should be allowed to fall again into disuse or that the enormous economic and social wastes inherent in our lagging community development should be allowed to continue indefinitely.

The use of foresight, imagination, analysis, plan, and design is especially important in critical periods such as that of today. It may be granted that the turn of future events cannot be surely and clearly forecast. Yet there are considerable areas in which well-laid plans will be applicable regardless of fortuitous turns. Variations in applicability of good plans are much more likely to be matters of degree rather than kind. Moreover, if flexible plans are available, eventualities may be met or alternative paths taken with greater promptness and assurance.

The cyclical events of the past three decades, including many foreseeable changes and many disasters to the unready, have clearly demonstrated the need of maximum foresight and preparedness—preparedness for possible war in time of peace, for the benefits of peace in time of war, for potential depression in time of high economic activity, for recovery in time of depression. Certainly in the present period of rapidly rising emergency activity it is necessary for leaders—of government in its executive and administrative branches, of industry, labor, and finance, and of professional and civic groups—to look not only at the immediate effort that must be expended but beyond to the inevitable redirection of effort in the use of our expanded resources. Even while meeting the inexorable demands of the present, the future of Nation and of region must be constantly in view.

Thus, this first skeleton plan and program for the future of the Pacific Northwest is offered. Since regional development and stabilization are of such broad concern, it is the hope of the Regional Planning Commission that such a statement will contribute toward understanding of regional aims and toward regional advancement, and also that agencies and individuals in the region will contribute to the development of a plan and program that will become increasingly complete, workable, and effective in both its public and private aspects.

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[4] National Resources Committee: *Drainage Basin Problems and Programs: Report of Drainage Basin Committee, Pacific Northwest Drainages.*

[5] Idaho State Planning Board: *Programming Procedure, Including Analysis*, 1940. Budget Division, State of Oregon: *Six Year Construction Program For Buildings, Hospitals Institutions*, 1940. Montana State Planning Board: *Six Year State Construction Program* and a *Program of Public Works For All State Institutions*, 1941. Programming Study, State of Washington, in progress.

PART IV

1. CURRENT AND ANTICIPATED PROBLEMS

The General Regional Problem

The general regional problem under consideration is that of progressive development. This involves improvement of the essential position of the region through the use of resources to round out the regional economy and to enhance the security and wellbeing of the people of the region and the Nation.

The first approach to the solution of this problem should be along the more or less realistic line of determining—by following such trends, and with the aid of such programs, as can now be visualized—where the region should go during the next ten or twenty years. The rate of progress and certain other aspects of this development may, of course, be materially altered by various emergencies—for example, by the war effort or the requirements of the post-war period.

The Region One or Two Decades Hence

What should be the appearance of the Pacific Northwest one or two decades from now? Too many imponderable factors are involved to attempt to answer such a question in detail. Nevertheless, it may be useful in clarifying objectives to present some tentative sketches of the new developments that may be expected as the direct result of current and prospective programs; to visualize some of the more prominent changes that should be sought in the period ahead. To give breadth and depth to this picture of the region's future, both the major geographic and the major functional areas where the possibilities for development are greatest have been described.

Grand Coulee—Columbia Basin Area

This project, certainly the most far-reaching now under way, will ultimately transform about 1,200,000 acres classified as suitable for farming under irrigation, within a total area of some two and one-half million acres of semi-desert, into a highly developed agricultural district, accommodating on the land and in its communities a quarter of a million people or more.

With the assured water supply that the project works will provide, the hazards of crop failure will be practically eliminated. Definite steps are now being taken—through a cooperative planning project sponsored by the Bureau of Reclamation—toward insuring that the lands shall be operated in adequate family-sized units; that the towns, utilities, and transportation services shall be laid out in the most economic patterns; that suitable areas shall be developed for recreational purposes; that a substantial number of farm families now without homes shall be rehabilitated on the project lands; that the types of farming adopted shall be those that will sustain soil fertility and produce commodities that can be marketed. Improved types of housing and of farm buildings should be much in evidence throughout the area.

The Columbia basin project will also have a strong influence on the general development of the whole region and its patterns of agriculture, industry, commerce, and population. Its power output, transmitted far beyond project borders, will have especially notable effects on regional industry.

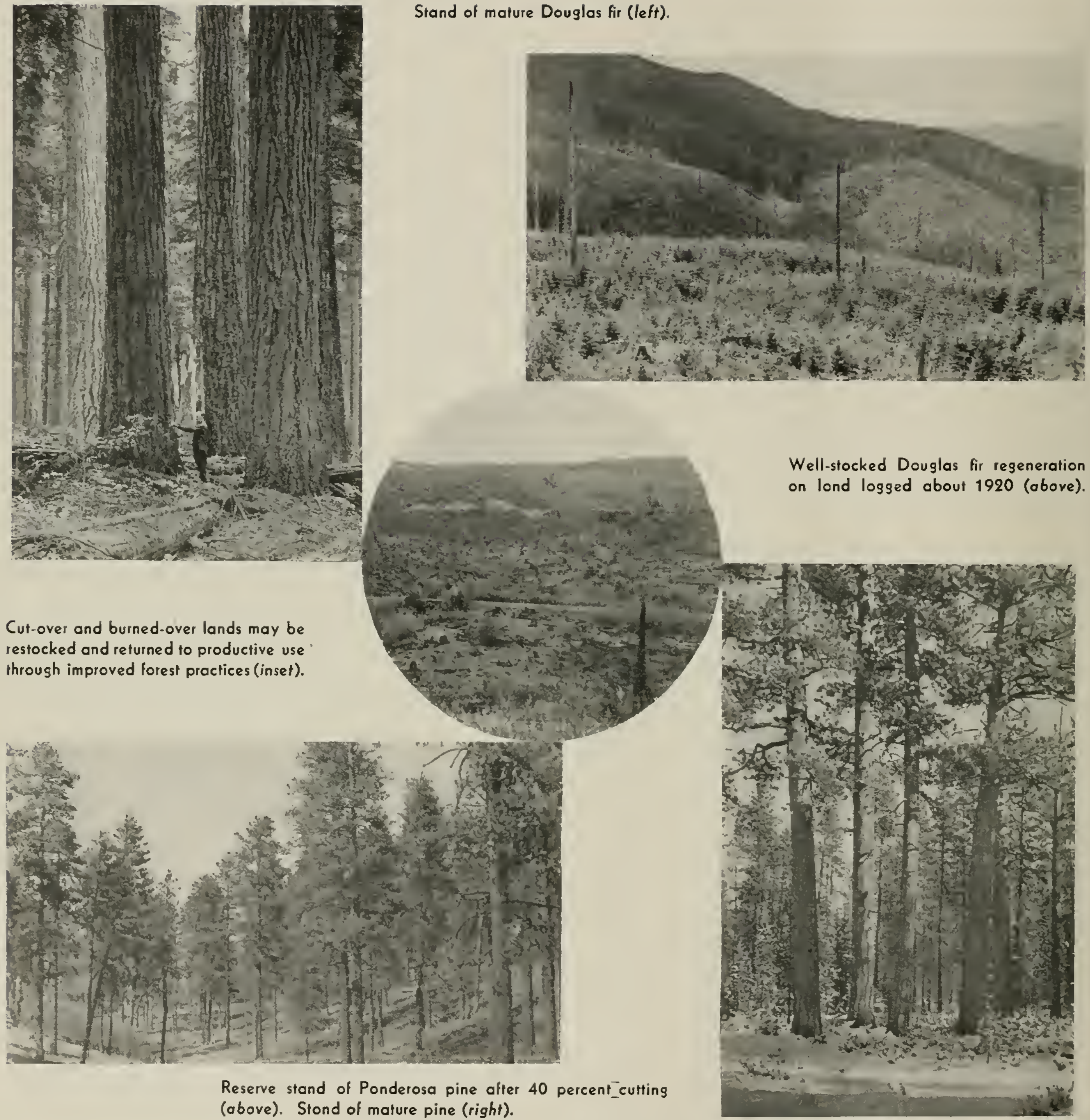
The Fertile Crescent of Southern Idaho-Snake River Basin

A broad crescent-shaped basin of fertile land extends from the Wyoming border through southern Idaho into eastern Oregon and constitutes one of the major assets of the region. Some 2 million acres lying in its eastern and western sectors are already developed. In both areas, however, supplemental water supplies are urgently needed and should be made available. This should give greater stability to the whole economy of the basin and enhance the standard of living. Much of the middle section, still in sagebrush and containing a million or more acres of potentially irrigable lands, should be under irrigation within 10 or 20 years. In this large new area, the opportunity to provide the basis for an improved way of life and added security on the land is similar to that under the Grand Coulee project. Development of needed new water supplies will require some diversions from one tributary to another and a unified plan of water control. The end result will be an agricultural subregion in which farming, grazing, and industry can develop in a nicely balanced relationship.

The great deposits of phosphate rock, situated in the eastern part of the basin, should become the basis of a mineral fertilizer industry adequate at least to supply the needs of western croplands.

The Willamette Valley of Oregon

This valley is the oldest agricultural area of the region, but for various reasons, it has experienced little new development in the past few decades. The coordinated water-control project authorized by Congress, involving construction of seven dams on headwater streams, will afford needed protection to many com-



Stand of mature Douglas fir (*left*).

Well-stocked Douglas fir regeneration on land logged about 1920 (*above*).

Cut-over and burned-over lands may be restocked and returned to productive use through improved forest practices (*inset*).

Reserve stand of Ponderosa pine after 40 percent cutting (*above*). Stand of mature pine (*right*).

Figure 50. Sustained Yield Forest Management.

munities and some 270,000 acres that now suffer frequently from damaging floods. It will provide a water supply for summer-months' irrigation of 350,000 or more acres. This will greatly enhance the productiveness of lands that normally become too dry before the crops reach maturity. The flood-protection features will also make feasible the drainage of large areas where productivity is now impaired by an excess of water. Improved inland navigation on the Willamette River, now confined almost entirely to the movement of log rafts, will be extended to Albany, some 70 miles above Portland.

As a result of these land improvements, farming methods, crops, and farm sizes should become more closely adjusted to land classes;[6] in turn, income of present farm units will increase, or land will be freed for additional units. An enlarged processing industry may well be anticipated as a result of the increase of intensity of land use and of specialty crop production by small-irrigated farms. The lumber industry should, within the next two decades, have passed through an inevitable period of adjustment. Abundant and low cost electrical energy should in due time have stimulated the development of a chemurgical industry based upon local resources. With such improvements under way, the aspect of the valley should gradually change from one of arrested growth to one of expanding opportunity.

Upper Columbia Drainage-Intermountain Areas of Montana and Idaho

The intermountain region of Montana and Idaho has received, in relation to its available farm lands, a very heavy quota of Great Plains migrants. The pressure resulting from such an influx of new population should hasten certain types of development that ordinarily might not occur within the near future. It seems very likely now that the next 10 years or so will bring about the utilization of almost every available acre of economically cultivable cropland in that area. Some of this will be in blocks of several thousand or more acres—like the Rathdrum Prairie tract in northern Idaho and a similar area in the vicinity of Missoula. One or more large storage reservoirs—one, probably, on the Flathead River to provide flood control and power, primarily, should be in the picture 10 years hence. The whole economy of this region should then be based on a well-integrated use of its farm lands, forests, minerals, and scenic attractions. It seems most likely that the people will be drawing their incomes about equally from all four sources.

The water conservation and irrigation work in Montana is considered especially significant. Here the State-Federal cooperative program has done a great deal to check disastrous trends and to make the land economy more secure in many parts of this great agricultural State. A series of planned projects of various degrees of magnitude has provided water for new and supplementary irrigation purposes, permitting more intensive development in valleys, shift of outlying lands from uneconomic dry farming to more extensive use, and putting into effect for large areas a more secure land-use pattern, in which the irrigated valley and surrounding range complement each other. This program should be considerably extended.

The strategy of inland locations for certain industries important in the national defense should lead to an industrial growth in these areas to balance that in agriculture.

Puget Sound, Lower Columbia, and Coastal Areas

This area now contains about half of the region's manufacturing capacity. Within a decade or two there should be a considerable change in the type of manufactures. Depletion of the virgin stands of old-growth Douglas fir timber will inevitably result in a decline of lumber output. This should be offset, at least in part, by an increase in the output of pulp and paper, alpha cellulose (wood pulp used for rayon), wood plastics, and other chemical products. There are also good possibilities for, and strong trends toward, the establishment of new metallurgical industries, such as iron and steel, alloys, aluminum and magnesium, chromium, etc. With expansion of basic industries in the region and in the event of favorable trade conditions in the post-war world, increased shipbuilding brought on by the present war program may conceivably lead to the permanent establishment of this industry in the area. The area should definitely continue to be an important center of airplane manufacture.

Incidentally, this increase in the volume of heavy manufacture and the need of lowest cost transportation (for bulk materials particularly) may ultimately lead to the interconnection of the inland waters of Puget Sound with those of the Columbia River—providing an inland waterway system extending southward and eastward to the heart of the Pacific Northwest hinterland, as well as northward and westward to Alaska. The further growth of secondary industries should, of course, follow closely on the heels of the heavy industries.

Agriculture will also expand considerably in this area through the clearing of suitable lands now covered with stumps, brush, and timber. It is important that this extension of agricultural land be confined to the good soils and to locations in which roads, schools, and other public services can be provided at reasonable cost. Rural land zoning and other forms of public and cooperative land-use control should be developed throughout the entire region; they are particularly applicable in this area with its diversified—metropolitan-industrial-agricultural-forest-recreational—uses of land and water. As in the Willamette Valley, there should be an extension of supplemental irrigation of crops and dairy pastures.

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[6] See *Willamette Valley Land Adaptability*, Station Circular 120, Oregon State Agricultural College, Agricultural Experiment Station. March 1937.

Smaller Projects and General Improvements

Outside of the more compact areas mentioned above, there will be in use a large number of smaller projects, all designed to conserve and control water, to reduce flood and erosion losses, to improve land use, and thus to help in stabilizing the economies of various areas of the region.

The range lands, within 10 years, should be well on the way toward full rehabilitation under private and public management, fully cognizant of its responsibilities for maintaining conditions that permit sustained production of forage for livestock and wildlife. While the current program of small projects has been locally effective, it represents little more than a beginning toward the desired stabilization of land use.

Progress has already been made in various localities in the reclamation of land through stump clearing. Costs have been lowered and the work accelerated largely through the use of heavy tractors and bulldozers, but there is need for more rapid classification of lands and for the development of more comprehensive projects and other aids to clearing that is economically desirable.

Flood control, diking, and drainage projects will also have brought in, to a relatively limited extent, desirable new lands in several parts of the region.

If an action program can be derived from the extensive investigations of mineral fertilizer resources and uses by the Congressional Joint Committee on Phosphates, it should have a far-reaching effect on agriculture, land use, and the maintenance of soil fertility, as well as on industrial development, in the Pacific Northwest.

The agricultural land planning program of the Department of Agriculture and the States and counties should also result in important adjustments and improvements in agriculture and land use.

Of potentially great importance to Pacific Northwest agricultural development is the program of the regional research laboratories of the Department of Agriculture. Beneficial results should be felt not only in agricultural market development, but in farm production and in industries related to agriculture.

The Generalized View of Future Land Development

The location and the limits of feasible development of new agricultural lands in the Pacific Northwest have been approximately determined through the general inventory presented in Part II of this volume. This classification of projects will serve as a general index to possible land delevopments in various parts of the region during the next one, two, or more decades. The inventory should be corrected and revised continuously as additional information about land-development possibilities becomes available.

The problem of agricultural adjustment in the Pacific Northwest is apt to remain critical. With the loss of the foreign markets for wheat and fruits and by reason of other marketing difficulties, it may be necessary to shift the pattern of Pacific Northwest agriculture farther away from special cash crops and toward feed crops and livestock farming, especially dairying. Because of the highly intensified land use in orchards and truck farms, this implies a need for more acres, if this shift is not to bring about the permanent displacement of part of the farming population now dependent upon small, intensively cultivated orchard and truck acreages.

Among the agricultural land-use problems and needs recognized in the unified State agricultural programs recently developed by the State land-use planning committees of the Pacific Northwest are the following:

(1) Long-term financial assistance to settlers for farm development on suitable cut-over land.

(2) Classifying and zoning against settlement of submarginal land for farm purposes.

(3) An educational program for settler guidance.

(4) Rural public works programs in settlement areas.

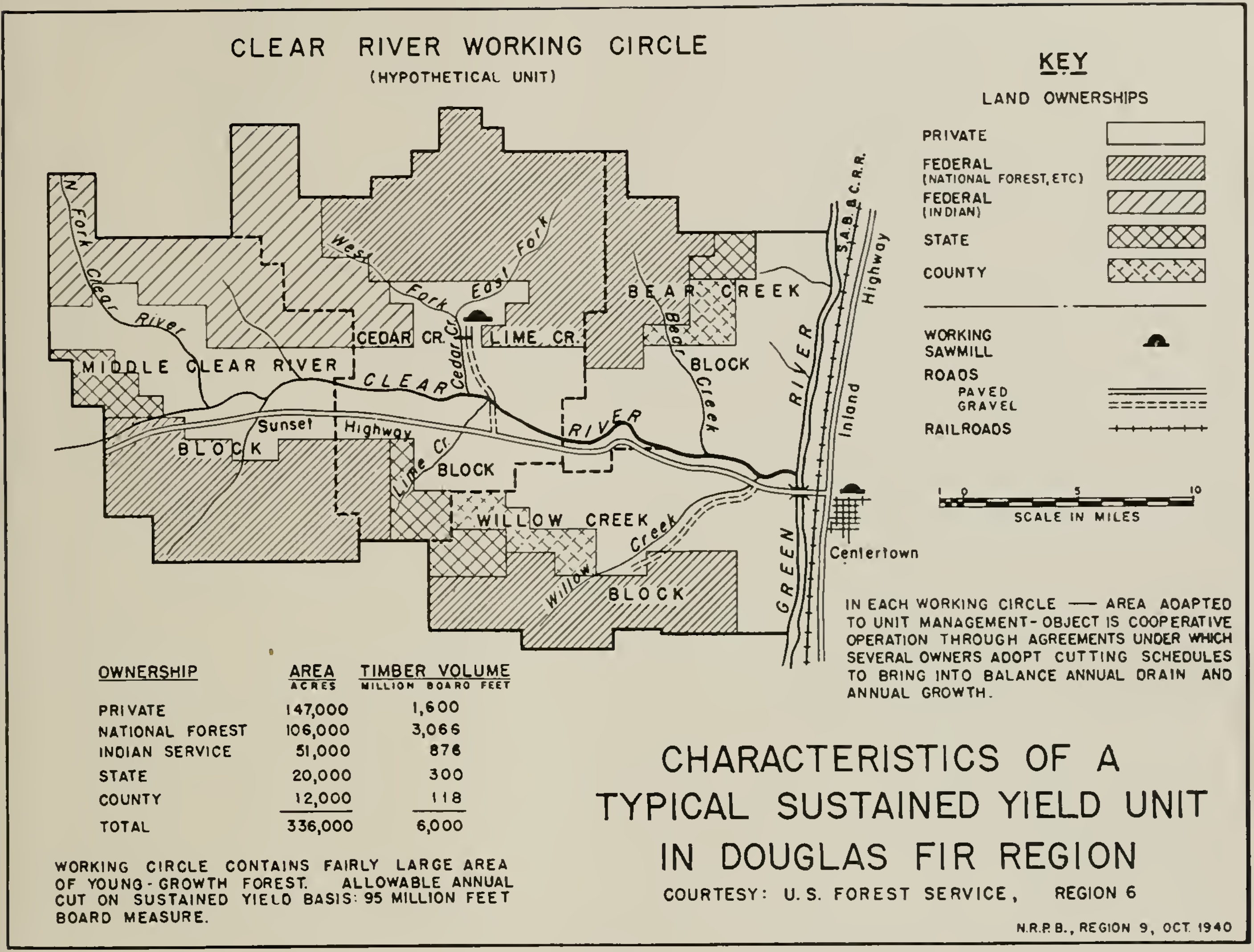
(5) Retirement of poor lands by purchase under Title III of the Bankhead-Jones Act.

(6) Continued and increased investigation of the feasibility of grazing use of cut-over lands west of the Cascade Range.

Forest Areas

The situation with respect to the forest resource and the forest industries indicates the need for a comprehensive and vigorous regional forest program. The problem is not only one of bringing growth and drain within reasonable balance on the basis of large subnational regions. The only satisfactory pattern, and one that the region should set about attaining, is that in which well located centers of forest products manufacturing become the hubs of forest land areas, each of which can be managed on a continuous-yield basis. If such a pattern can be established within a reasonable time, the forest industries of the Pacific Northwest might not only avert, in part, the decline that looms ahead but, in time, increase their present vital contribution to the region's means of livelihood.

The need for organizing forest operations on a sustained-yield basis is commonly acknowledged at the



OWNERSHIP	AREA ACRES	TIMBER VOLUME MILLION BOARD FEET
PRIVATE	147,000	1,600
NATIONAL FOREST	106,000	3,066
INDIAN SERVICE	51,000	876
STATE	20,000	300
COUNTY	12,000	118
TOTAL	336,000	6,000

WORKING CIRCLE CONTAINS FAIRLY LARGE AREA OF YOUNG-GROWTH FOREST. ALLOWABLE ANNUAL CUT ON SUSTAINED YIELD BASIS: 95 MILLION FEET BOARD MEASURE.

IN EACH WORKING CIRCLE —— AREA ADAPTED TO UNIT MANAGEMENT-OBJECT IS COOPERATIVE OPERATION THROUGH AGREEMENTS UNDER WHICH SEVERAL OWNERS ADOPT CUTTING SCHEDULES TO BRING INTO BALANCE ANNUAL DRAIN AND ANNUAL GROWTH.

COURTESY: U. S. FOREST SERVICE, REGION 6

FIGURE 51

present time. Within 10 years most of the commercial forest lands should have been definitely tied into a system of operating units that would serve as the basis for ultimate stability of the industry. Such units cannot be plotted on a regional map at the present time, because each will be subject to detailed study and negotiations. It is possible to delineate, on the basis of Forest Service studies, a hypothetical area to illustrate the general scheme that should be worked out by cooperative action of private forest owners and the Federal and State forest services. (See figure 51.)

Current forest programs have accomplished much toward conservation of a substantial part of the Pacific Northwest region's outstanding forest resource. Some notable advances are being made in the field of protection from fire, toward improved forest practices, and, in a few working circles, toward sustained-yield operations. The recent establishment, under private industry leadership, of cooperative demonstration projects for more intensive protection and restocking and for sustained-yield management of large areas may foreshadow important future developments. The exhaustive investigation of the Congressional Joint Committee on Forestry will, it is hoped, clarify public policy and bring into effect a Federal-State-industry action program commensurate with the magnitude of the regional resource and the values at stake both directly and indirectly.

A large part of the nonstocked cut-over and burned-over land in the Pacific Northwest is of a quality that would justify rehabilitation by planting or by some other method. Within 10 years, this area should have been placed under stable ownership (State, Federal, or private), and definite work should be under way to

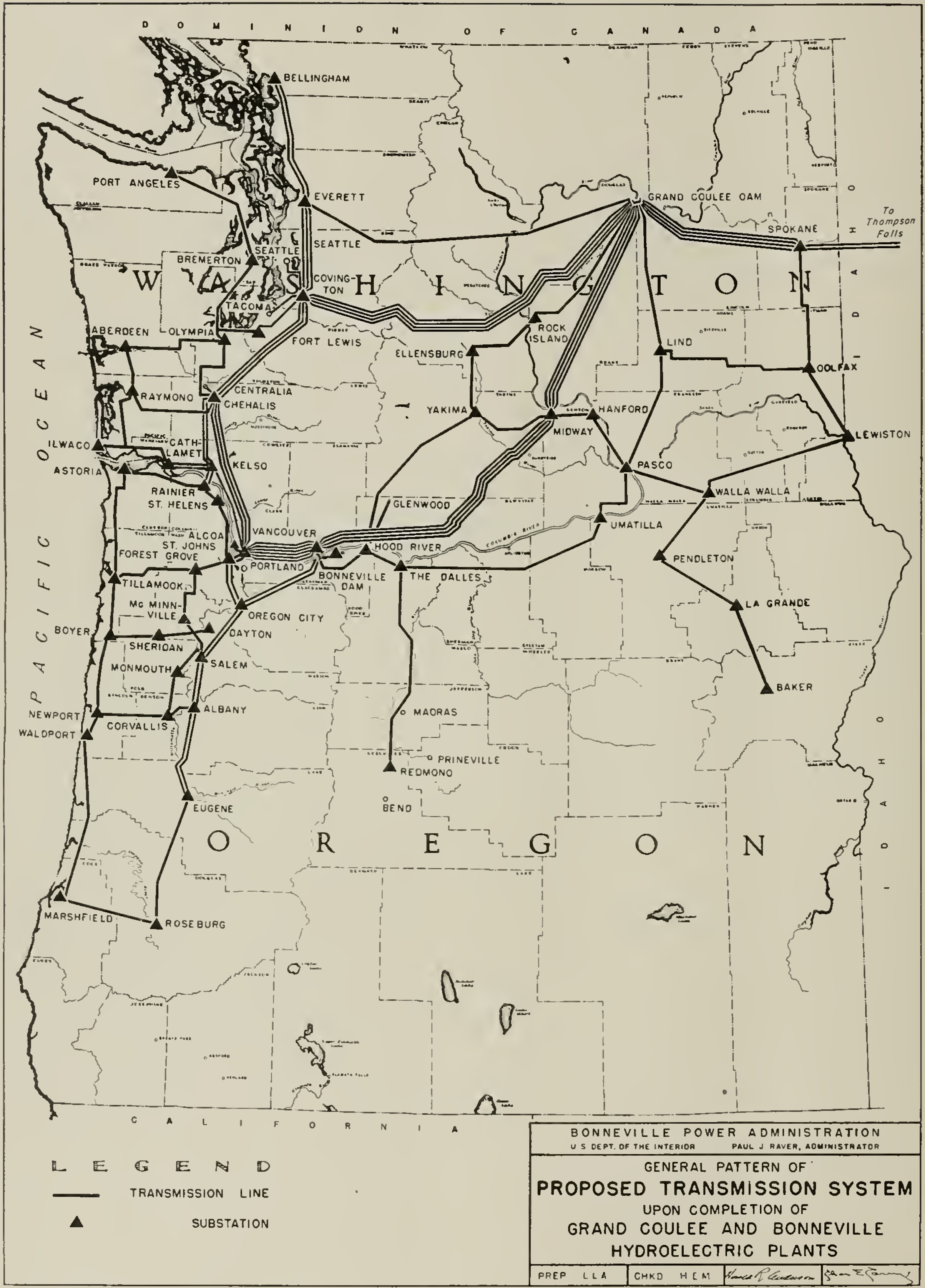

DOMINION OF CANADA
BELLINGHAM
PORT ANGELES
EVERETT
SEATTLE
BREMERTON
COVINGTON
TACOMA
WASHINGTON
GRAND COULEE DAM
SPOKANE
To Thompson Falls
ABERDEEN
OLYMPIA
FORT LEWIS
ROCK ISLAND
ELLENSBURG
LIND
COLFAX
RAYMOND
CENTRALIA
CHEHALIS
YAKIMA
MIDWAY
HANFORD
LEWISTON
ILWACO
ASTORIA
CATHLAMET
KELSO
PASCO
WALLA WALLA
RAINIER
ST. HELENS
GLENWOOD
UMATILLA
ALCOA
ST. JOHNS
FOREST GROVE
VANCOUVER
PORTLAND
HOOD RIVER
BONNEVILLE DAM
THE DALLES
PENDLETON
TILLAMOOK
McMINNVILLE
OREGON CITY
LA GRANDE
BOYER
DAYTON
SHERIDAN
MONMOUTH
SALEM
BAKER
NEWPORT
WALDPORT
CORVALLIS
ALBANY
MADRAS
PRINEVILLE
REDMOND
BEND
EUGENE
OREGON
MARSHFIELD
ROSEBURG
PACIFIC OCEAN
IDAHO
CALIFORNIA
COLUMBIA RIVER
LEGEND
TRANSMISSION LINE
SUBSTATION
BONNEVILLE POWER ADMINISTRATION
U S DEPT. OF THE INTERIOR
PAUL J RAVER, ADMINISTRATOR
GENERAL PATTERN OF
PROPOSED TRANSMISSION SYSTEM
UPON COMPLETION OF
GRAND COULEE AND BONNEVILLE
HYDROELECTRIC PLANTS
PREP L L A
CHKD H E M

Figure 52

restore it to its best productive use, whether for forest growing or, in some instances, for grazing.

In addition to this work of restoration, there should be in operation some system that would prevent abandoned forest lands from lying derelict for years as they now do. Action by the States in taking over, or arranging for, the effective management of such critical areas should be quick and automatic.

Regional System for Transmission and Interchange of Power

The foundation lines for a Pacific Northwest power grid system are already under construction. Expansion of generating and transmission facilities should proceed safely in advance of demand. An Executive Order has placed the marketing of energy from both Bonneville and Grand Coulee under a single administration. This step should be supplemented by enabling legislation that would provide the Columbia River power agency with a more flexible, corporate structure, better adapted to business operations; with a well-defined policy; and with financial, research, and other functions essential to the marketing of power on an energetic and progressive basis.

If the regional power and industrial program proceeds with reasonable speed, additional generator installations and the main features of the grid system should be well advanced within 10 years. All the principal generating stations and load centers should have been interconnected. The exact location of extensions and interconnections will be determined by demand growth and other factors that cannot entirely be foreseen. The type of general layout, however, that seems most probable is indicated by figure 52.

The Federal power program is unquestionably having a penetrating and vital effect on the regional economy. Power production at Bonneville and Grand Coulee is serving and will continue to serve in the establishment of nationally and regionally needed industries. The power-using industries and the energy resources should be brought together as promptly and effectively as possible.

The Bonneville Power Administration has made significant progress in power-system planning and construction, in interconnection with a view to stabilization of production and use, in interchange of energy, and in marketing and sale of available and prospective output. Prospective accomplishments, in well-integrated system operation and in broad and beneficial power use, of far greater magnitude lie ahead.

Transportation

Progressive improvements rather than dramatic new features are likely to be the chief characteristics of transportation development within the next 10 years. The region is already well crisscrossed with a network of railways, highways, and airways (figure 53).

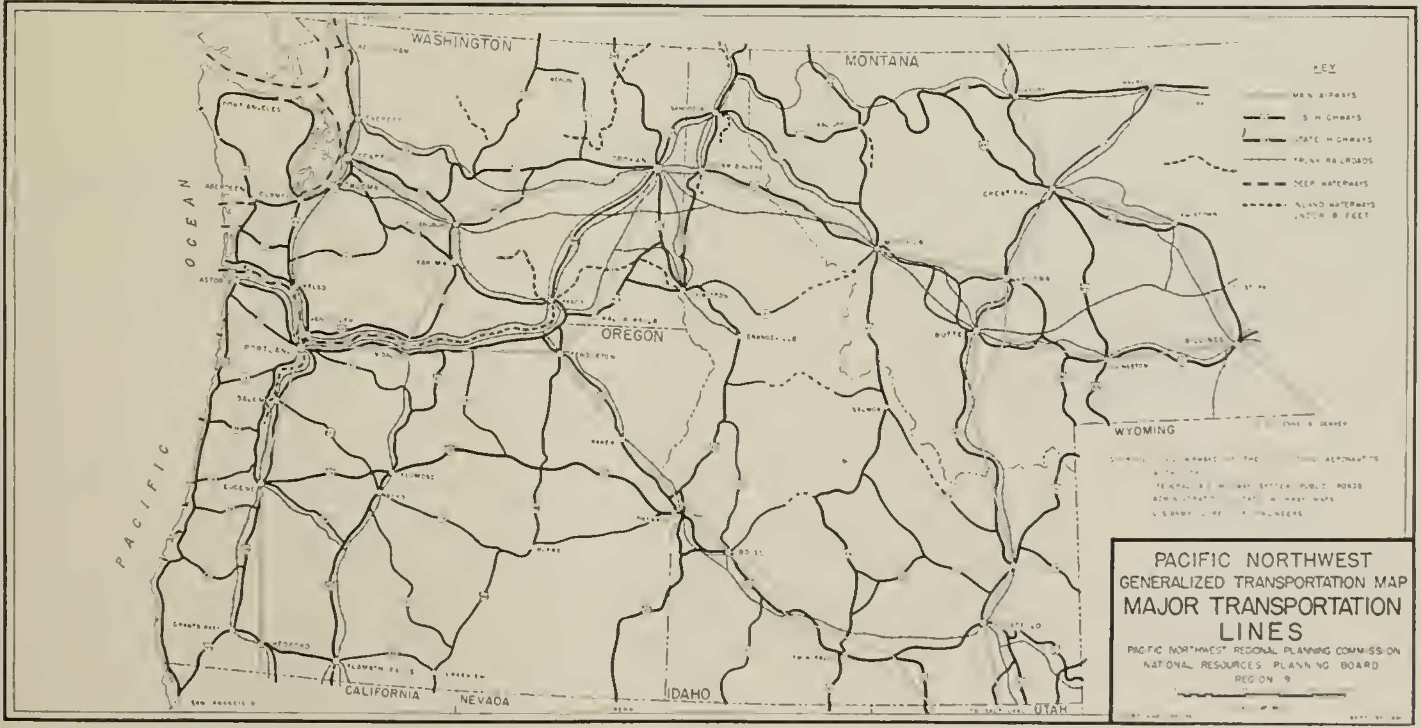
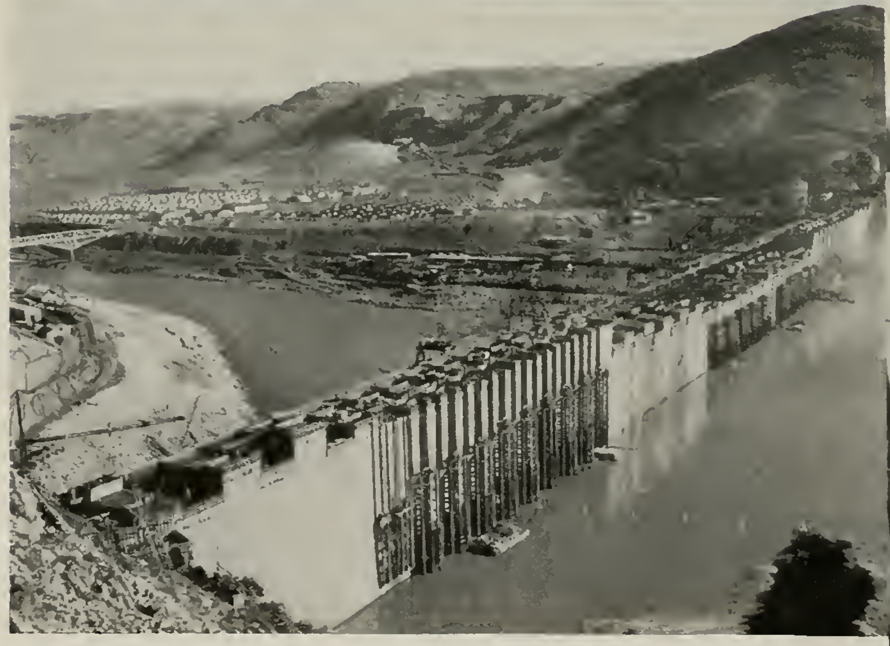
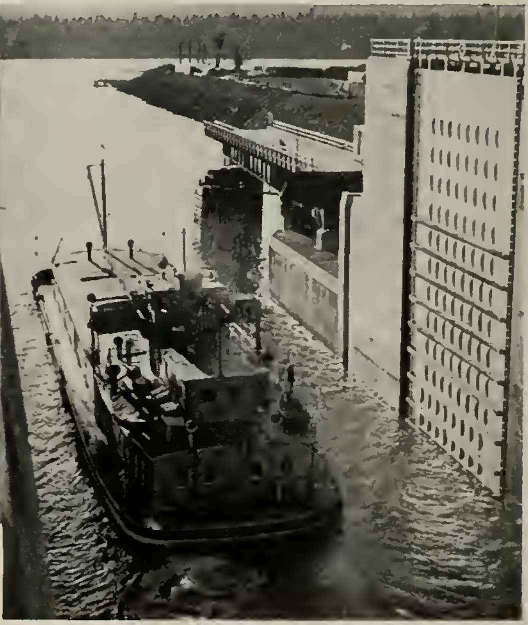

WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
CALIFORNIA
NEVADA
UTAH
PACIFIC
OCEAN
KEY
MAIN AIRWAYS
U.S. HIGHWAYS
STATE HIGHWAYS
TRUNK RAILROADS
DEEP WATERWAYS
INLAND WATERWAYS UNDER 8 FEET
PACIFIC NORTHWEST
GENERALIZED TRANSPORTATION MAP
MAJOR TRANSPORTATION LINES
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

FIGURE 53

Spillway Dam, Bonneville project, on the Columbia River, for navigation and power (*left*).

Transformer, Bonneville Power Administration substation, serving aluminum plant at Vancouver, Wash. (*above*).





Diversion dam, Missouri River, near Toston, Mont. (*above, center*); Grand Coulee Dam, Columbia River (*above*); lock at Bonneville Dam to facilitate navigation (*right*).

Figure 54. Public Works.

Completion of the navigation features of the Bonneville project has been followed by a new upsurge of inland water traffic on the Columbia River. Further deepwater and inland navigation improvements, under way and proposed, including the Columbia-Lower Snake trunk and the Willamette waterway, should aid in bringing new resource and industrial developments within economic limits, and also in facilitating and stabilizing operations of large units in the lumber industry.

The great distances between the more highly developed areas of the west (Puget Sound, lower Willamette, San Francisco Bay, Spokane-Inland Empire, Boise-Snake, Butte-Anaconda, Helena-Great Falls, Salt Lake, for example), as well as current national and world trends in aviation, will, no doubt, be a very powerful stimulus to the growth of air transportation and facilities therefor in the region. The development of Alaska and the establishment of closer relations with Canada and Latin America will stimulate transportation developments of interest to the Pacific Northwest; overseas and coastal navigation; international highway links; and more extensive air services, particularly to the farther northwest.

Because of all of these factors, it is safe to expect a considerable expansion of airport and airway facilities and some expansion of other port and terminal facilities in the region. It will also be logical to expect, within a decade, under favorable conditions as to available capital, labor, and materials, a beginning of extensive general improvement, reorganization, and integration of transportation terminal facilities in urban centers.

Industrial Development, and Industrial Location Patterns

A strong trend toward the establishment in the region of new basic industries is in progress—particularly in the metallurgical and chemical fields. The coming decade should see a broadening and stabilization of this new trend. Equally important, it should witness a parallel establishment of fabricating, processing, and manufacturing industries. Without the latter, the basic industries will lack security; regional industry will lack elements making for good integration and reasonable stability; the region's resources will not be effectively employed; and regional markets for the final products of these regional industries will not be economically supplied.

Since heavy power-using industries are likely to be a most important factor in the region's future industrial growth and since a policy of uniform wholesale rate has already been adopted for the sale of power from the Federal system, there is no need for high concentrations of industry either at generating plants or in congested urban centers. A combination of factors relating to transportation, raw material availability, power lines, water supply and other utilities, climatic conditions, labor supply, and other conditions and services is likely to be controlling in determining the location of industries. For certain types of industry important to national defense, relative security from air attack may be a deciding factor.

In order to make all relevant information more readily available and to help overcome the inertia that has led in other regions to extreme concentration, plant site surveys, location, and other technical and economic studies covering the entire region have been initiated by the Bonneville Power Administration, with the cooperation of the Regional office of the National Resources Planning Board, and other agencies. These and related investigations should be pointed toward the widest practicable decentralization of industrial activity in the interest of a well-distributed regional growth, and the maintenance of good living conditions for workers. Some marked effects of power transmission lines, of power sales policy, and of planning for industrial location, on the geographical pattern of industrial activity, should be apparent in 10 years.

The Pattern of Urban Growth

In common with all other cities of the country, the urban communities of the Pacific Northwest have central areas that are blighted, and have a sprawling fringe that keeps pushing out in haphazard fashion beyond the city limits. This movement creates extremely serious problems for municipal government and for the owners of downtown property. The people who move to the fringe are likewise handicapped by inadequate school, safety, and utility services.

The urban picture 10 years hence should not show the effects of another decade of this destructive movement. Rehabilitation of blighted central areas should be in evidence in every city. Low-rent housing projects should have been carried out in many of these areas. Material progress should have been made in solving arterial highway, parking, and other traffic problems, and in the rationalization of terminal facilities in the more important cities. In some cases, urban fringe settlements might also have been improved by the application of planning and controls that would concentrate them in a reasonable number of greenbelt communities.

Recreational Development

Because of their economic importance to the region, it is essential that the coming decades show marked progress in the use and enjoyment of the region's recreational resources. Policies and programs should be perfected or materially advanced for the preservation of outstanding scenic and primitive areas and also for the further provision of well-designed facilities for the use of these resources—roads, trails, and shelters, for example. Special effort should be made to see that each type of area is accessible at the season in which people wish to go there—mountains in both summer and winter, desert in early spring, alpine areas in late summer, etc.

Progress should be made toward harmonious, multiple use of land resources for various purposes, including recreation. In many areas of considerable scenic worth, it is necessary to have policies and plans that will permit simultaneous, nondestructive usage for recreation and for a number of other purposes as well: Timber growing and harvesting, agriculture and grazing, and mining, industrial, commercial, and community development. The degree of success attained in harmonious multiple use will be a measure of the ability of the people of the region to adjust themselves to their environment.

Education

In the Pacific Northwest, outstanding progress has been made along certain educational lines closely related to regional development. With the aid of the Northwest Regional Council, notable work has been done in the stimulation of regional research, and in the preparation and use of regional and resource materials for educational purposes. In connection with the latter activity, the (national) Commission on Resources and Education in 1940 selected the Pacific Northwest as a demonstration area and cooperated in the establishment of "resources and education workshops" for teachers. Continuation of such activities should bring about substantial progress in understanding of and adjustment to the regional environment.

The Region as a Whole and the Need of Over-All Public Planning

With a reasonable degree of consummation of the areal and resource programs outlined, the Pacific Northwest as a whole should be very considerably advanced in the period under consideration—toward broader use of resources, a more mature and better balanced economy, more stable employment, and improved standards, facilities, and services for urban and rural life.

Many programs and projects, large and small, are influencing the progress of the Pacific Northwest. The more significant of these from the viewpoint of regional development are those that have, or promise to have, the deepest effects on the regional economy—those that react on the foundations of that economy. If the basic, wealth-producing activities are stimulated or built up, the erection of the superstructure of subsidiary and service activites is practically assured. Programs in the basic fields are quite generally too broad to come within the purview of individual enterprise and are the concern of the people as a whole. Here, as well as for the supporting framework of essential public services in the superstructure, public planning, and programming are most urgently required.

Defense Problems and Regional Development

In the foreground of the view of long-range objectives are the immediate needs of national defense. To ensure national security, it is necessary to adjust the use of every region's resources—men and materials, economic and social facilities—toward the organization, mobilization, administration, training, operation, and supply of the military forces. The Pacific Northwest must play its proper part, as determined by national authority and dictated by strategic and tactical considerations, in the military aspects of defense—in providing for the location and establishment of Navy, Army, and air defenses, bases, and training stations. It must also provide, in harmony with various military and economic factors, for the location, development, and operation of essential defense industry. Beyond this, it must provide the transportational, distributional, and community facilities necessary in the environment of both military and industrial establishments.

In the location of these new establishments, it is necessary to take into account military, geographic, and economic factors jointly: those of personnel, matériel, space and time; of elevation, topography, cover, and natural resources; of raw materials, energy, industry, utilities, and community facilities. A number of major geographic and economic factors may be adjudged favorable to the location of defense establishment in the Pacific Northwest. Abundant, low-cost power, very important in many instances, is available. Raw materials are available or accessible for a variety of industries. Trunk transportation lines of various kinds are adequate for much more intensive use. Inland waterways add to feasibility of locations well inland for a number of strategic industries. Economic, terrain, space, and time factors are such as to favor development of a flexible plan of industrial location and dispersion. A series of mountain barriers—from the Coast Range to the Rockies—provides intermountain valleys, some of which are as far inland from the Pacific as is the Mississippi Valley from the Atlantic. Better use of the resources of the region may go hand in glove with a material improvement in existing patterns of industry, as well as with a rational distribution of defense industry allocations.

Deconcentration and decentralization of industry may be found desirable from the immediate as well as the long-range viewpoint. Development of western defense resources may be considered especially desirable from the standpoint of actual and possible defense operations in the Pacific area. Such development will add to the productive capacity and the economic strength and self-reliance of the western area, and it will tend to decrease the burden on national transport in time of emergency and to increase regional and national security generally.

From a regional viewpoint, Pacific Northwest factors appear to be favorable to the establishment of important or significant fractions of a number of industries vital to the national defense: Among these are such basic metallurgical and chemical industries as iron and steel, alloy metals, ferroalloys, copper, zinc, brass, aluminum, magnesium, nitrogen, phosphorous, potassium, carbide, chlorine and chlorates, and cellulose; and manufacturing industries producing ships, boats, aircraft, plastics, wood products, metal products, ordnance materials, and munitions.[7] Industries of these types will help materially to fill the serious voids in the economy of the Pacific Northwest, which heretofore has devoted itself so largely to the production of raw materials. In most cases, there would appear to be good prospects for the adaptation and survival of these industries in the post-emergency economy.

The adaptation or development of community facilities in defense areas presents similar problems throughout the country. The problem of the community—beyond the immediate adjustments necessary in providing sites and utilities—revolves largely around the impacts of new population or of population shifts. The rapid expansions or concentrations of military or industrial personnel do not raise problems of a new kind; rather they accentuate the old problems of providing adequate community improvements and services. The great pressure of time imposed by the threat to national security adds to the dilemma of defense communities.

Since the community job is the more or less familiar one of providing for added or shifted people, the range of difficulties and the kind of adjustment needed can be accurately anticipated as to kind if not as to quantity. With each large new establishment, military or industrial, new or changed needs will be felt with respect to such facilities and services as land, water, raw materials, energy, fuel, transportation of various kinds, transmission lines, various utilities, housing, schools, hospitals, recreation, fire and police protection, and traffic control. In addition, new loads that will often be quite unbearable, at least temporarily, without outside help, will fall on public finance and on Government in general. It is in all of these categories that serious difficulties have actually arisen in defense communities everywhere.

The extent and urgency of expansion in many defense communities accentuates the need for planning that will be thorough in spite of speed—planning against serious error and lasting community dislocations, against the mere projection of present patterns; and planning toward a better integration of new industry, toward better neighborhoods, better communities, and better regions.

The national defense program in the region does not pose an entirely new or separate problem from that of regional development. Both should involve the use of all resources. The defense considerations that must permeate plans and programs in nearly all development fields will generally change the emphasis and timing of programs rather than the development aims and programs themselves.

Apparent Trends and Effects of Defense Program

The total and final effects of the current war effort on the regional economy cannot be forecast with any certainty at this stage of the program. The first year of intensive effort (mid-year to mid-year, 1940–41) did, however, show trends from which the following generalizations may safely be made:

The industrial base of the region is being broadened by the establishment of new primary and manufacturing industries.

Basic industries being established or likely to be established—for example, aluminum, magnesium, general chemicals, and alloy metals—should stimulate the subsequent establishment of needed processing and manufacturing activities.

Certain fabricating and manufacturing activities, namely, aircraft and shipbuilding, are decidedly on the increase in the region. It appears to be possible that much of the activity in aircraft building will continue in the post-war period because of the proximity of basic-metal industries, because of expanding commercial needs, and because of the swift obsolescence of aircraft at the present stage of development. If a basic iron and steel industry is established in the region, it may be possible to save a part of the ship and boat-building industries in the post-emergency period.

Manufacturing in the Pacific Northwest as a whole is probably increasing currently at a rate at least on a par with that for the United States as a whole.

New industrial activities in the region are, however, very highly concentrated—primarily in the Puget Sound area and secondarily in the lower Columbia area. Beyond increased extraction of essential minerals—zinc, copper, etc.—there is as yet little new industrial activity in the rest of the Pacific Northwest. Concentration of new defense activities in the Puget Sound and lower Columbia areas tends further to accentuate the existing disparity in industrial activity between the seaboard and the hinterland of the region.

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[7] *Industries Important to National Defense Feasible of Establishment in the Pacific Northwest*, Bonneville Power Administration, Market Development Section, 1940; also *Feasibility of Iron and Steel Production in the Pacific Northwest Using Columbia River Hydroelectric Power*, Bonneville Power Administration, 1939.

New industrial activity, is, so far, also very highly concentrated in two industries—aircraft and shipbuilding.

Economic opportunity in the region is undoubtedly increasing in absolute values at present.

In the region as a whole, employment is unquestionably on the increase, but distribution of new employment is not good. The less active areas are training and losing to the active areas technical workers and skilled labor. Workers are currently moving in considerable numbers from diverse areas in the region to limited coastal areas with intensive defense activities—particularly to California and to the Puget Sound areas, and perhaps to some extent to the eastern industrial centers as well.

Undoubtedly, income and consumption are rising generally, although with considerable areal variations.

New capital investment in the region is certainly quite large. Again, the new capital plant is being located in rather restricted areas. Industrial capital is being invested largely in the Puget Sound and lower Columbia areas. There is some new capital investment in a few interior centers—such as Pendleton, Spokane, and Boise—because of the expansion of air corps establishments and because of auxiliary investment in new housing, community, and distribution facilities. Major new industrial investments are largely in the aluminum, airplane, shipbuilding, metallurgical, and chemical industries; hence, in nearly all cases, national rather than regional capital predominates. There is probably more local investment in connection with the supplying of parts, under subcontracts, for aircraft and shipbuilding industries and also in housing and general construction. There should be expanding opportunity for regional capital in the secondary manufacturing activities that should follow the basic establishments.

Social services are lagging behind in Pacific Northwest defense areas, as elsewhere. Outstanding needs in this field have already been mentioned.

There lies in the defense program some promise of more rapid development of certain resources needed both for national security and peaceful progress—the region's great hydroelectric power and its strategic minerals, for example. Since, however, activity also carries the threat of economic dislocation upon its ultimate cessation or slackening, it is esential that development plans and programs cover the readjustment to more normal activities and progress.

The Post-Emergency Problem [8]

The problem of post-emergency readjustment and reconstruction is many-sided: It is one of consolidating the economic gains of the war activity; of taking advantage of mobilized resources, men, equipment, energy, and materials; of bringing about a shift instead of a cessation of economic activity—of maintaining full employment. It is one of taking up slacks and filling gaps in the economy, of stimulating productive industry, of improving the means of distribution, of undertaking overdue community reconstruction, of increasing the rate of social progress.

The problem is also one of planning, of programming, of design, of finance, and of organization. From the regional development standpoint, it is highly important that there be objectives and plans for the inevitable post-defense readjustment—whenever and however it may be necessary to meet the shift in emphasis and activity. It is essential that there be available a reservoir of economically and socially useful programs and projects to absorb a part of the shock; also that surveys be made and plans prepared, land, legal, and financial obstacles cleared, in order to prevent delay in beginning work on meritorious projects. It is also essential that organization and organization plans be ready at various levels of government to permit the prompt inauguration of public and quasi-public works.

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[8] See *After Defense, What?* National Resources Planning Board, 1941.

PART IV

2. PUBLIC POLICY AND ACTION IN A PROGRAM OF IMPROVEMENTS

It is essential to recognize the key place of public policy and public works, as well as the importance of effective use of all available resources, in connection with both national and regional development. If we are to go ahead—adding constantly to our income, improving and broadening our standards of living, and reducing our unemployment of capital and labor—we must make best use of our resources. This will involve continuing capital outlay in public and quasi-public works as well as in private industry. The growth of industry is not only highly dependent upon market expansion but, to a considerable extent, upon the parallel development of creative, wealth-producing public works, utilities, and services. The full employment of resources—men, science, technology, money, plant, machinery, materials—is not possible without construction and reconstruction of public works and quasi-public works.

Recognition of what the region has, where it is, and where it should go, and of the gaps in past progress and the barriers to future advancement is essential to a realistic determination of its major deficiencies and needs in policies, works, industries, and services and of the possible ways of meeting them.

A large share of the progress of the region depends upon national movements and rates, rather than upon conditions within the control of the people of the region in themselves. Regional resources must, however, be used, regional deficiencies filled, and regional barriers lowered, if the region is to move ahead, in mesh with other regions and in harmony with national progress, toward a higher and more secure position.

Uses of the Design Concept

In all of these planning and programming efforts, there is need for a constantly widening use of the principles of design. In planning for the single, one-purpose project, and even for the smaller area, design involves primarily physical factors and consequently is more concrete, more tangible. For example, the purpose of design for a building is to adapt it to the functions it will have to perform and to enable it to withstand physical forces—gravity, wind, and various loads. For the small community, design is again primarily a matter of the arrangement of physical facilities—living, industrial, commercial, transportation, educational, recreational, etc.—to suit community functions; but even in this instance, the importance of social and economic design should be more generally recognized. For the large, multiple-purpose project, all of the factors mentioned enter into the design, and there are important additional factors to be taken into consideration: The relation of function to function and unit to unit; the relation to other projects in a system; the relation to auxiliary projects; the relation to markets for output, the relation to economic return on investment; the relation to social and economic benefits, and so on.

For example, in connection with the Pacific Northwest's largest project—Columbia Basin-Grand Coulee—it is recognized that the complete plan involves the design of many things beyond the primary irrigation, power, and water control facilities; that it involves design of land use; of farm subdivision and farm economy; of a system of communities and facilities for transportation and distribution; of individual communities and community additions; of basic facilities for local industries; of recreational facilities; of public works of various kinds; and of governmental organization and machinery to meet new needs. Such design extends far beyond a single designing organization to perhaps two score agencies who must share in the effort and whose work must be correlated toward an effective over-all design for the area.

It is not a great step from such a concept of project and area design to one for a State or a subnational region. The fundamental criteria are not different. Good design must still be based on functional considerations. The region should be designed as the home and environment in which a proper proportion of the Nation's people may live and produce. It should be designed as an economy—without rigid limits, not too sharply defined, not too self-sufficient, but in effective, complementary, and flexible relationship to the other regional economies and to the whole national economy.

In the design for regional development, the economic and social factors will predominate. Design must also be applied in the field of public administration to facilitate coordination in the development and execution of over-all programs. Selected, generalized physical features are subject to design on a regional basis: land and water development; use of the sustaining material resources; the production of energy; the circulatory systems of transportation, energy transmission, and distribution. Improved patterns of population, community, and industrial location are also susceptible at least to indirect influences of rational design—through such measures as land-use planning, resource development, transportation and transmission line locations, governmental aids and services, and educational work.

If the break-down of our democracy under the sheer weight of unsolved economic problems in this technical age is to be avoided, it must be made increasingly practicable for the citizenry clearly to understand our basic problems. A rational design for utilization of resources, provided its fundamentals can be set out in simple yet fair and realistic terms, will, in most cases, sell itself to the majority and thereby obviate the need of any more than the minimum of governmental intervention or compulsion. The full benefits to be realized from the broad application of principles and procedures of planning, design, and programming, on a decentralized basis and with the collaboration of all interests concerned, are vital enough to warrant far greater use of these principles and procedures than has yet been attempted.

Interrelation of Public and Private Programs

It should be borne in mind that the regional program, to be realistic and effective, must not only include public projects, but should take cognizance of significant private projects as well. The public programs are, as previously intimated, essential to regional development, either directly or as part of the basis for private development. Private programs—financial, industrial, commercial, service—and private attitudes and cooperation will also, however, have much to do with the ultimate regional development.

The middle ground of public and private enterprise should not be overlooked. Public, quasi-public, mixed, and nonprofit and limited-dividend private corporations are capable of increasingly effective use in the fields of regional and community development or reconstruction.

Since there is no centralized control of public programs in the region and since private programs are subject only to partial public control (which, furthermore, is generally negative rather than positive), cooperation is of the essence in the development and acceptance of the major elements of a regional program.

It is feasible for both public and private interests to cooperate, increasingly, in program planning and design. It can happen; cooperation of this kind has been had in certain fields: In a forest-resources study, sponsored by the Regional Planning Commission in 1938, Departmental, State, industry, and public representatives substantially agreed upon a statement of the situation and a minimum program of Federal, State, and industry action toward solution of the regional forest problem. The Pacific Northwest Drainage Basin Committee (in common with other such committees throughout the country) in 1937 submitted a comprehensive program for drainage-basin development. A broadly representative Pacific Northwest Land Advisory Committee likewise agreed on a number of recommendations covering, substantially, the range of a general land program. In current studies also, individuals and groups consulted have reached rather wide agreement as to population and industrial problems and needs, as well as with respect to land and public work programs. There has also been a rather general concurrence with the objectives of the previously published *Framework of a Regional Development Plan*. This type of cooperative effort might be broadened and extended to cover other individual fields and to consideration of the over-all regional program.

It is realized that the steps following the formulation of a program are the more difficult ones. It is necessary, then, to look to improvements in governmental and economic processes that will facilitate action on generally accepted programs and further the exercise of some degree of unified management and coordination in the further design, expansion, and actual effectuation of such programs.

Public Investment and Public Directives in Defense and Reconstruction Periods

Public investments and directives in the defense and war periods must be primarily for the establishment and operation of military stations and facilities and of various kinds of munitions industries. Further public investments and directives are required in the expansion of civil works and facilities in defense areas. In the interest of national security, it has also been necessary to extend controls with respect to production, employment, transportation, price stabilization, and other sectors of the national economy.

A considerable part of the new capital improvements for military and industrial facilities and nearly all of the civil improvements under the war program will be related to continuing economic and social activities. Accordingly, their permanent effects and the problems of post-emergency shift and adjustment should enter into their planning.

Obviously, public and quasi-public work and service programs of considerable magnitude will be required in the post-war adjustment period to supplement private industry in maintaining employment and income at a high level. The publicly controlled programs will have to be of a sufficient order of magnitude so that a substantial degree of regulation of economic activity can be exercised through them. They will also have to be sufficiently large for a realistic and adequate attack on the accumulated tasks of reconstruction. Nevertheless, it is fully recognized that such use of public works in the post-war effort is only one of several measures that will be required for employment stabilization.

The role of public agencies must cover other aspects of reconstruction beyond the planning and programming of improvements. It will be necessary to stimulate private investment in both improvements and in industry and to aid in the organization and financing of large cooperative projects. It will be necessary to aid in shifts in industrial investment and to foster the beneficial use and output of industrial plant. It will be necessary for Government to continue to exercise controls looking toward full use of resources, and toward progress and stabilization, not only in the structure of industrial production, but in those of finance, price, and foreign and domestic commerce.

It is part of the public role to develop the improvements that are basic to the establishment of industry and the generation and maintenance of economic activity, and that will lead toward lasting adjustments in regional and areal economies. In considering such developments, we should not be unmindful of the effects of a number of large, pioneering, public and quasi-public projects in the history of our national and regional development—of inland waterways, ports and ships, railroads, highways, and power systems as prime movers in the development of large sections and great industries of the Nation.

A considerable portion of the war effort and expenditure has been made and probably will continue to be made in the construction of plant and machinery. To prevent serious dislocation, as well as to promote needed physical reconstruction, a considerable fraction of the post-war national income should be expended in the construction and allied industries.

The types of improvements needed, first, to take up the slack and, second, to resume the march toward orderly regional development are extensive and varied. The previous discussions of regional problems and regional objectives provide a general view of the range of needed and desirable improvements. The current regional program of internal improvements is a first, incomplete, reconnaissance survey of the known development projects contemplated or proposed by various agencies.

Many of the more important and significant types of reconstruction projects will not be adequately covered in the program initially presented. The nature of a number of needed and economically feasible projects is such that no single agency is responsible for their development. More comprehensive national, regional, State, district, rural, metropolitan area, and city planning than that now in existence is required for the uniform development of complex, broad-purpose projects. In the field of water use and control, the National Government has for some time had machinery for the development of multiple-purpose river projects. Planning agencies for a relatively small number of large cities and metropolitan districts have been implemented sufficiently well to develop plans for large urban reconstruction and rehabilitation projects. It is extremely desirable that by the beginning of the post-war era, ways and means be provided more generally for the planning, design, and programming of many complex projects, the consummation of which will bring far-reaching benefits to local and regional economies and to human welfare. A process of area analysis, based on that tried out by the National Resources Planning Board in a limited number of areas in 1941, applied to typical areas throughout the region would be instrumental in bringing out the most fundamental needs.

Among the types of projects that have not been generally developed for a number of reasons are those for:

> Urban reconstruction—rehabilitation of run-down neighborhoods, slum clearance, blighted area rehabilitation, housing.
>
> Modernization of highway systems—international, interregional, interurban highways; urban arterial and belt highways; urban parking areas; grade separations; limited access highways; park and parkway systems.
>
> Coordinated transportation—terminal and interchange facilities for integrated use of various means of transport; consolidation of urban terminal and distribution facilities.
>
> Industrial area development—basic facilities for properly located and zoned urban, suburban, and rural manufacturing areas.
>
> Navigation facilities—adaption and reconstruction of facilities for overseas and inland navigation.
>
> Air navigation—reorientation of aviation facilities toward civil aviation, and further development of commercial-passenger and cargo-air transport.
>
> Power transmission and distribution—extension, strengthening, and integration of transmission grid and distribution lines.
>
> Rural conservation projects and programs in agricultural, grazing, and forest areas.
>
> Land reclamation—clearance of cutover and stump lands suited to agricultural use.
>
> Public health—district and interstate programs for pollution abatement and control.

In these and in similar programs and projects public leadership and organization is indispensable.

If such programs are to be available for use in the coming post-emergency readjustment period it is necessary that many steps be taken in advance. The essential steps preliminary to construction include: investigations and surveys, advance planning, advance designs, land or right of way acquisitions, financial programming, and removal of legal barriers.

It is also necessary to plan in advance and to provide enabling legislation for various organizational measures. In many areas enabling legislation, organization, and appropriations are required for planning and zoning. Improved organization and implementation is needed for interagency planning. Enabling legislation is generally needed for governmental aids and cooperation in the planning, financing, construction, and operation of quasi-public and private works—including public, mixed, and nonprofit and limited dividend private corporations for carrying out reconstruction projects of various kinds.

Program of Public Works

An all-inclusive public works program would of necessity embrace the programs of every governmental entity—Federal, State, county, district, municipal—within the region. Such a complete program is not practicable of attainment, but it is desirable to have as a base the programs of the Federal development agencies, the States, the more important development districts, and the more important (or at least typical) counties and municipalities.

A formal public works program, for any governmental agency, consists primarily of: (1) an inventory of desirable and feasible projects, arranged to show preferential priority and proposed construction cost over a period of years—say 6 or 10; (2) a narrative justification for each project; (3) a financial analysis, showing relative financial feasibility of each project, capital cost, annual maintenance and operating costs and their effect on tax rates, and the effect of the program as a whole on indebtedness and taxation.

Progress in Programming

At the present time, definite progress is being made in the long-range programming of State public works. The four Pacific Northwest States—Idaho, Montana, Oregon, and Washington—have prepared, or have in process, initial 6-year programs. In Idaho, the programming project followed a general State-wide study and report on public works plans and programs. The Montana State water conservation and planning boards have made substantial progress toward fundamental and realistic public works planning and programming, particularly in the fields of land and water use, through the State water conservation program and through a State-wide study of opportunities and needs for land settlement and land-use adjustment (based quite largely on the county agricultural land planning project). In Oregon, the program covers State institutions primarily. In the fourth State, Washington, a broad programming study is in progress.

The city of Spokane completed and published a 6-year program of public works, which, together with several other demonstration projects carried out by various municipalities throughout the country, should provide a valuable guide to other cities. A number of cities have recently expressed interest in the procedure. A reconnaissance study of public works is being carried out in the Puget Sound region, which includes a number of counties and cities.

Public Work Reserve

At the direction of the President, a Public Work Reserve has recently been established in the Federal Works Agency for the purpose of building up a Nation-wide reservoir of projects that may be undertaken by local, State, and Federal agencies upon the reduction of wartime activities. The project will operate under the sponsorship and general supervision of the Federal Works Agency, with the National Resources Planning Board, as cosponsor, functoning in an advisory capacity. The program constitutes a reconnaissance survey to determine the location, magnitude, and nature of necessary public improvements and service. It is intended that the survey will provide a backlog of useful projects that may be kept up to date and ready for action. The program calls for cooperative effort to further advance planning and programming at all levels of government and to produce a well-rounded program that will be related to the needs of industrial readjustment and expansion as well as to those of public service.

Administrative Correlation of Plans and Programs

Progressive, orderly, well-balanced and distributed development of the region calls for very careful attention to certain aspects of public administration. It calls less for new administrative agencies or machinery than for improved machinery for the correlation of development work—for the improvement of procedures for the interchange or clearing of important information, investigations, and plans; for bringing and holding together the vital parts of broad development programs throughout the complex procedures of planning, programming, budgeting, approval, and execution. Without such clearing and correlating work on a well-established and recognized basis at State, regional, and national levels, the most needed and worthy of development programs tend to deviate from objectives, to lose essential elements or relationships, or even completely to dissolve.

The reserve of public work and public service projects should be assembled with due recognition of the need of inclusion and correlation of the plans and programs of the many administrative agencies concerned.

The administrative factor has long been recognized as a most important one in the problem of regional development, both by the National Resources Planning Board and its predecessors and by the Regional Planning Commission. The National Resources Committee's study of regional factors in national planning and development[9] gave exhaustive attention to this problem. In its 1935 study, the Regional Planning Commission—asked to report on the future prospects of the Pacific Northwest and upon types of organization that should be set up for the planning, construction, and operation of public works in that area—recommended continuation of planning organization on a State and regional basis, and suggested establishment of a coordinating committee in the region.[10] It was further suggested that this committee should be representative of the Federal departments concerned with regional development, that it and the Regional Planning Commission be closely interlocked or associated, and that it should aid in the coordination of major features and priorities of plans, programs, and projects for conservation and development in the region.

A similar arrangement has been suggested as a result of the Regional Planning Commission's current study of migration, economic opportunity and related problems, and of possible channels for the more effective clearing and correlation of Federal and State programs bearing on the solution of these problems.[11]

It is believed that procedures, techniques, and habits of coordination and cooperation can be developed and expanded on the basis of experience of recent years in over-all planning and in the development of plans and programs in such fields as land, drainage basins, forest resources, public works, and so on. The experience of the Bureau of Reclamation and cooperating agencies in connection with the cooperative Joint Investigations for the Columbia Basin Irrigation Project should also prove valuable in the formulation of procedures for coordination of other development programs.

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[9] *Regional Factors in National Planning and Development,* National Resources Committee, 1935.

[10] *Regional Planning, Part I—Pacific Northwest,* National Resources Committee, 1936.

[11] *Migration and the Develapment of Economic Opportunity in the Pacifia Northwest,* Pacific Northwest Regional Planning Commission, 1939.

PART IV

3. ELEMENTS OF A REGIONAL PROGRAM OF IMPROVEMENTS

The preliminary regional program of internal improvements that follows is based on an initial, consolidated assembly of projects that the regional office of the National Resources Planning Board has been able to make in a general survey of available material. In many respects, particularly as to local and private projects, the survey could be only of a sampling character. It was not practicable, within current means, to extend a project inventory to all regional areas and agencies. Many very significant and desirable projects and programs are as yet unformed or are lacking in sponsorship, and hence can only be discussed in a general way. Since project lists cannot be full in any case, endeavor has been made to include in tabulations only those considered of definite regional significance or typical of potential projects in various fields of regional development. The program presented, then, is far from a complete one.

It is hoped that this first preview of an over-all program be succeeded by other programs more completely developed as to ground covered, as to projects included, as to relative valuation of projects, and as to analyses of ways and means for the accomplishment of need and feasible improvements.

The major purposes in presenting a program are several: It should aid in the translation of desirable objectives for regional development into tangible accomplishments. In combination with the studies of migration, land development, and industrial development, it indicates elements of a program of action to meet needs growing out of long-term and recurrent waves of population movement to the region. It looks toward readiness (in the post-emergency period particularly) of a reservoir of public improvements that may be drawn upon in maintaining a high level of employment and income and in advancing regional development simultaneously. It should stimulate the further development of advance planning and programming procedures by the States and their subdivisions in the region. It should aid in clarifying interrelationships of various projects and programs and promoting needed cooperation and coordination with respect to public improvements. It should aid in the removal of obstacles to construction of selected projects.[12]

Internal improvement projects are related to regional development in a number of ways and in varying degree; One type of work projects is definitely developmental, wealth producing, and investment inducing—for example, a reclamation and power project which in the development or rehabilitation of an area generates other improvements and general economic activity. Another type provides facilities for essential services but has less marked or less direct effects in generating other work and activity; many public building projects, for example, are in this class. Both types are effective in their immediate effects upon industry and employment. However, from the standpoint of regional planning and development, it is desirable to place the greater stress on the more fundamental developmental projects and programs.

If the regional program is to have full value and realism—if it is adequately to cover these developmental programs—the approach must be a fundamental one. It should be made not only through all of the construction agencies but through the analysis of various areas as to the nature of their economies, their employment patterns, their deficiencies, the logical directions of readjustment, and the character of public works and services needed for stabilization and development in each case. Ideally, a regional program of internal improvements should embrace all of the projects, public and private, that are of such importance and significance as to affect materially the development and progress of the region and its constituent States and areas. Projects should be selected from the programs of the Federal departments, the States, local governments, and joint planning groups. Major developmental projects of private sponsorship should be integrated into the general plan so far as practicable. Throughout the process, advice and cooperation should be sought of various industrial, commercial, technical, and civic groups, as well as of the governmental agencies concerned.

Federal Program

A number of departments and bureaus of the Federal government are engaged in construction of public works in the Pacific Northwest region. As in other regions of the West, the Federal interest in resources and development is relatively high. Many of the Federal projects are of conservational and developmental type and of considerable regional and national importance. Quite generally, these projects must take prominent place in a Pacific Northwest regional program. Some of the projects of the Reclamation Service and the Corps of Engineers, for example, are of such magnitude and type as to serve as a foundation for a considerable structure of public and private improvements to meet auxiliary industrial, service, community, and governmental needs.

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[12] *Development of Resources and Stabilization of Employment in the United States*, National Resources Planning Board, 1941.

State Programs

The States of Idaho, Montana, and Oregon, with consulting assistance of the National Resources Planning Board, have recently completed six-year programs of public works; the State of Washington is now preparing a similar program. These programs of public works, representing as they do the best judgment of the authorized State officials, incorporate the projects considered most essential to the operation, welfare, and development of the respective commonwealths. The criterion for their selection is their importance to the State and not their significance to the region as a whole. The programs of the four States, nevertheless, afford extensive and valuable inventories from which many projects of very considerable importance in a regional program may be selected.

Local Programs

A really comprehensive regional program of public works should encompass the programs of all governmental agencies within the area, including counties, cities, and smaller units.

However, such an all-inclusive program has not been possible of attainment within the limits of information, time, and funds available. Advance planning of public works is not general practice among smaller units of government.

It is particularly desirable that municipal projects of more than local significance be incorporated in a regional program. An example of such a local project is the proposed sewage disposal plant of the city of Portland, which, in turn, is part of a larger area program for pollution abatement in an important drainage basin. Accordingly, an effort has been made to obtain from various sources information as to representative projects. Some of that information is included in the program as a fair sample of kinds of local improvements proposed.

As indicated previously, it will be necessary to look to work in this field—comprehensive community reconstruction, rehabilitation, and improvement projects for a considerable fraction of post-emergency construction activity.

Private Programs

Obviously, a long-range program of quasi-public and private works cannot be assembled with the same degree of authority as a program of public works. Private projects, dependent upon individual and corporate initiative and on all the varied hazards of business, are not centrally planned or programmed to any great extent. Except in a limited number of fields, there are no potential clearing houses for information as to proposed improvements. Often information as to private plans will not be available for public use.

On the other hand, the extent of public interest in production and distribution in times of emergency—the extent of public aids and the effect of large private projects on public programs—would warrant public effort to estimate the nature and magnitude of the private programs. A number of private projects in the Pacific Northwest are of such significance to the regional economy as to justify some kind of consideration in connection with any comprehensive program of public improvements. Prominent among examples of important programs in this category would be those for construction of basic industrial plants (such as metallurgical, chemical, shipbuilding, and aircraft works); for the expansion or improvement of public utilities (power, transportation, transit, etc.); for the reconstruction or improvement of port, terminal, storage, distribution, and marketing facilities; for the improvement of urban and rural housing.

In all such programs, public cooperation—in planning, organization and financial aids, for example—will be very important if the works are to have the best practicable effect on employment and general economic stabilization and on regional development.

Functional Program

The character and extent of a regional public improvements program are best presented on a functional basis—under headings corresponding to resource and development fields. Under each classification, effort has been made briefly to review the situation and outstanding needs, to present a short list of significant or typical projects under consideration by various agencies, and to outline some of the potential programs and projects that should be included in an adequate public work reserve.

Water Use and Control

In the Pacific Northwest, projects for water use and control rank very high in their effects upon the regional economy. The use of water resources for navigation, irrigation, power, fishery, and other purposes has had very great influence upon the present development of the region. Equally large effects upon the region's future are certain, as brought out in previous discussion of regional problems and objectives and in other parts of this report.

A general plan and program for drainage basin development in the region has previously been prepared and published, together with background statements of the conditions, problems, and deficiencies in this field.[13]

In the field of water use and control a great part of the programs and projects are of multiple-use type. The social and economic desirability and feasibility of various projects are usually greatly enhanced by use of multiple-use principles. Investigations and recommendations are commonly made on this basis, and many potential projects are included in the "308" reports[14] of the Corps of Engineers, as well as in reports of the Department of Agriculture, the Bureau of Reclamation, and other governmental agencies.

Programs for water use and control are very important to all parts of the region, as well as to the region as a whole. Navigation is of particular importance in coastal, Puget Sound, Willamette, lower and middle Columbia, and lower Snake drainages. Because of the wide distribution of the region's hydroelectric energy resources, power is important throughout. Irrigation is vital in present and potential agricultural areas east of the Cascades, in areas of southwestern Oregon, and in small areas in northwestern Washington; moreover, the importance of supplemental summer irrigation for Puget Sound, the Willamette and other valleys between the Coast and Cascade ranges is increasingly recognized. Drainage is of especial importance in coastal, Puget Sound, Willamette, and lower Kootenai drainages. Flood control is a notable problem in Puget Sound and coastal drainages, in the lower Columbia and Willamette valleys, in the Spokane and other northwestern tributaries of the Columbia, and in several local areas. Commercial fisheries are especially important in the Puget Sound, coastal, and lower Columbia waters, with maintenance of spawning areas a necessity in many upstream reaches. Sport fisheries, rivaling commercial fisheries in total value, are widely distributed throughout the Region. Pollution abatement problems are in especial need of attention in certain streams in Puget Sound metropolitan areas, and in a number of other streams, including, particularly, the Willamette, Yakima, Spokane, and Boise. The importance of water use by migratory waterfowl as well as fish should be recognized in all programs. Recreational use of water is important in many areas through the region.

Programs and projects relating to various controls and uses of water are presented under the headings: flood control, water and soil conservation, irrigation, power, and pollution abatement, immediately following. Those relating to wildlife and navigation appear later in the report.

Potential work in this general field is very large and diverse and is capable of contributing very greatly to regional wealth, stability, and general development.

Flood Control

Flood control problems are of such magnitude and of so much more than State and local significance that the Congress, by acts of 1936 and 1938, recognized a large measure of Federal responsibility for their solution. As a consequence, practically all flood control projects within the Pacific Northwest, as elsewhere, are constructed under the direction and at the expense, in whole or part, of the United States.

The larger flood control problems of the Pacific Northwest region are found in the wet Pacific slope areas of Oregon and Washington, west of the Cascade Range. However, there are localities east of the Cascades where combinations of flashy, torrential rainfall, rapidly melting snow, and configuration of topography, in the vicinity of populated areas, result in occasional damaging floods, which require control measures.

It is roughly estimated that nearly a million acres of land in the whole region are subject to overflow, with an average annual damage of about $2,000,000; also that about $35,000,000 has been expended in the region to date by Federal and local governments, on such protective devices as levees, revetments, channel clearances, and drainage facilities.

Lower Columbia and Willamette Basins.—The flood control problem of the lower Columbia Basin is one of protection, from late spring floodwaters, of valuable bottom lands along the tidewater-level reach of the Columbia and along lower reaches of tributaries, between the Cascades and the sea. The major part of the projected diking and drainage work for these lands has been carried out by the Corps of Engineers.

The Willamette River, the principal tributary of the Columbia in its lower drainage basin, traverses a highly cultivated valley, which contains many cities and a large population, both urban and rural. Here is a combination of a large watershed with high average rainfall and run-off per square mile, a limited channel capacity in the main stream, and a wide, flat, low flood plain upon which is located much valuable property. This has resulted in many destructive floods of some magnitude, occurring on an average of once every 5 years, with

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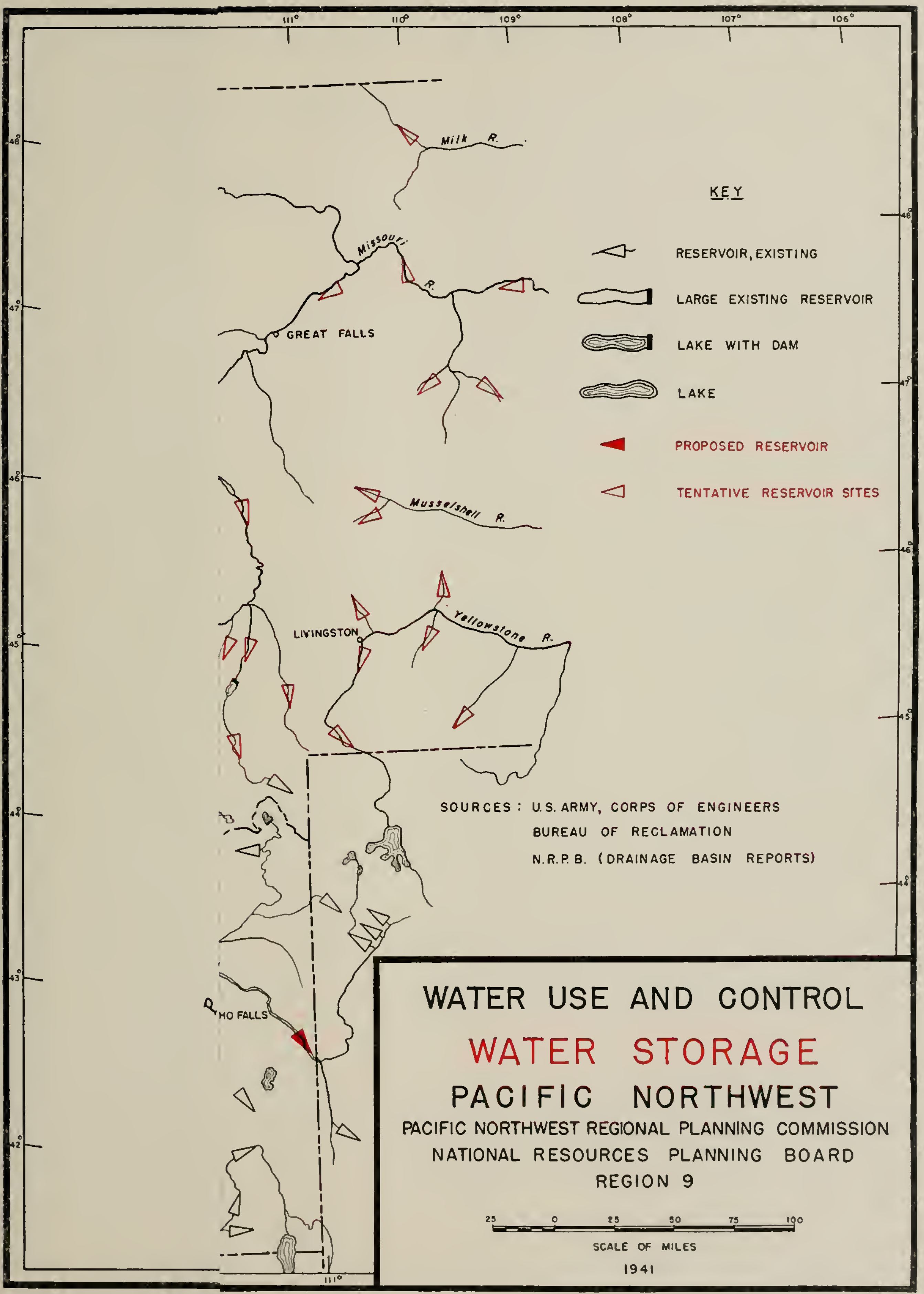
[13] *Drainage Basin Report for Pacific Northwest Basins*, Pacific Northwest Drainage Basin Committee and Pacific Northwest Regional Planning Commission, National Resources Committee, December 1937.

[14] Thirteen basic reports, and revisions thereof, for Pacific Northwest drainage basins made under authority of House Document 308, 69th Congress, 1st Session.



SOURCES: U.S. ARMY, CORPS OF ENGINEERS
BUREAU OF RECLAMATION
N.R.P.B. (DRAINAGE BASIN REPORTS)

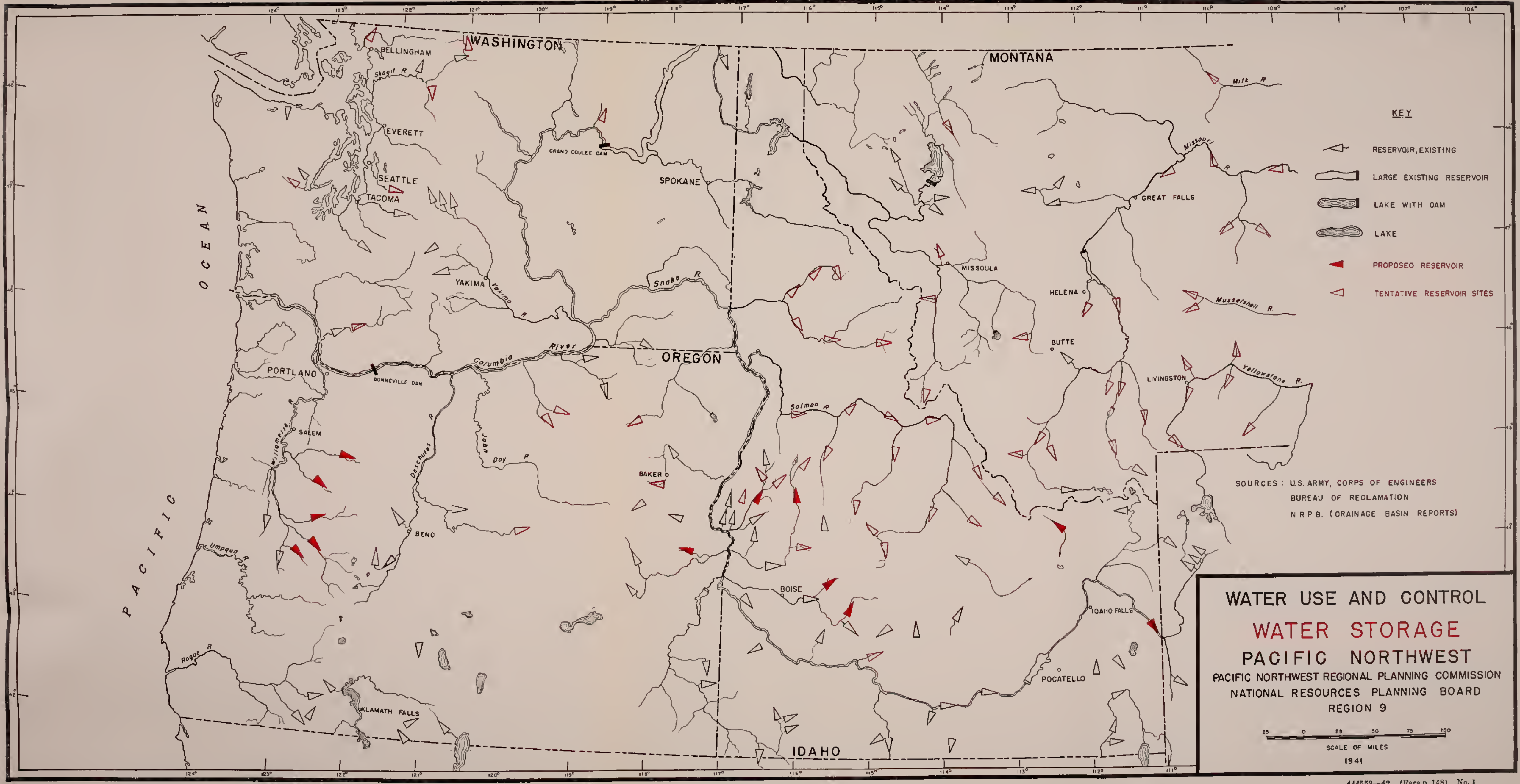
WATER USE AND CONTROL

WATER STORAGE

PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941



WATER USE AND CONTROL

WATER STORAGE

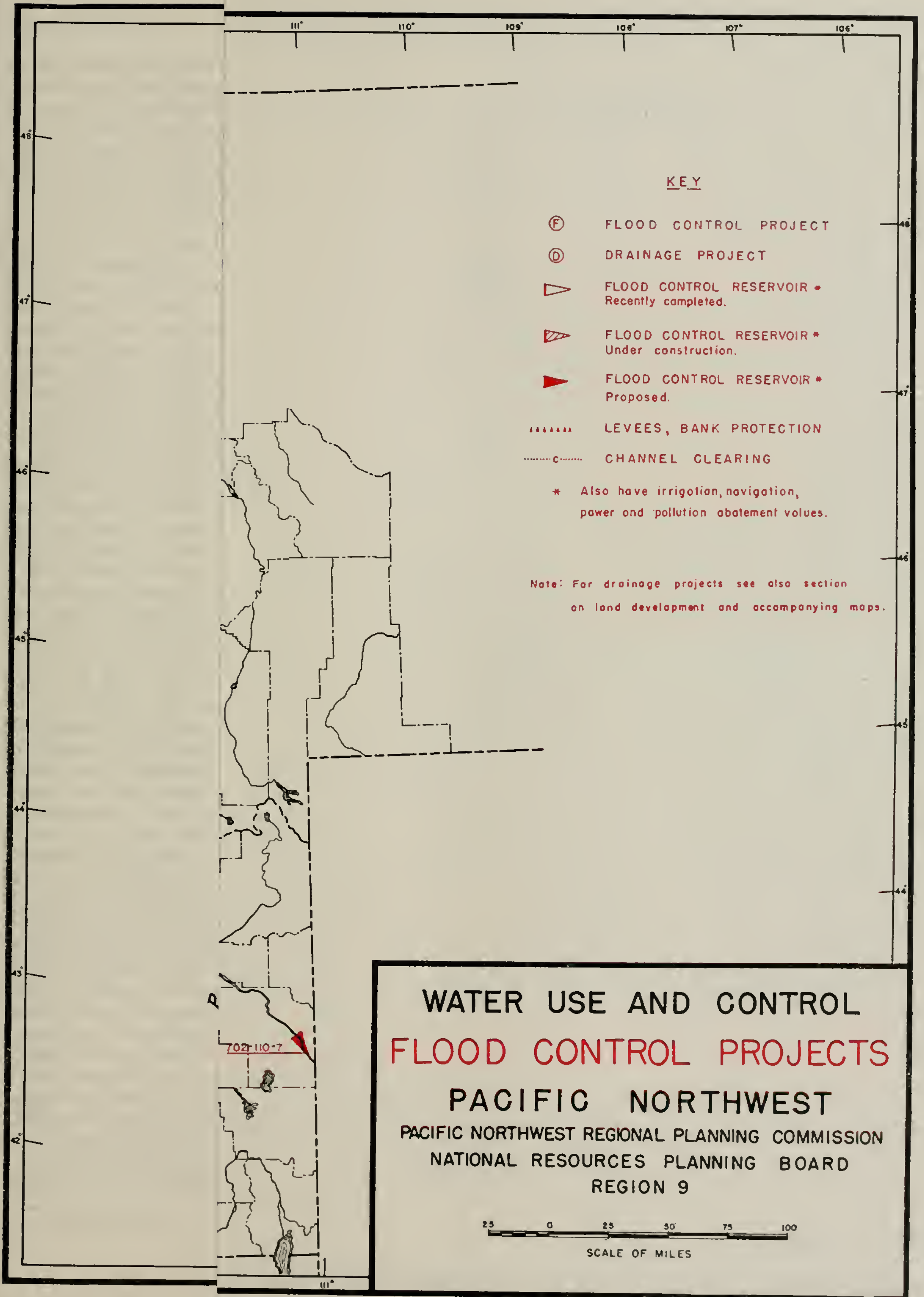
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

SOURCES: U.S. ARMY, CORPS OF ENGINEERS
BUREAU OF RECLAMATION
N R P B. (DRAINAGE BASIN REPORTS)

FIGURE 55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KEY
Ⓕ FLOOD CONTROL PROJECT
Ⓓ DRAINAGE PROJECT
FLOOD CONTROL RESERVOIR * Recently completed.
FLOOD CONTROL RESERVOIR * Under construction.
FLOOD CONTROL RESERVOIR * Proposed.
LEVEES, BANK PROTECTION
CHANNEL CLEARING
* Also have irrigation, navigation, power and pollution abatement values.
Note: For drainage projects see also section on land development and accompanying maps.
702 110-7
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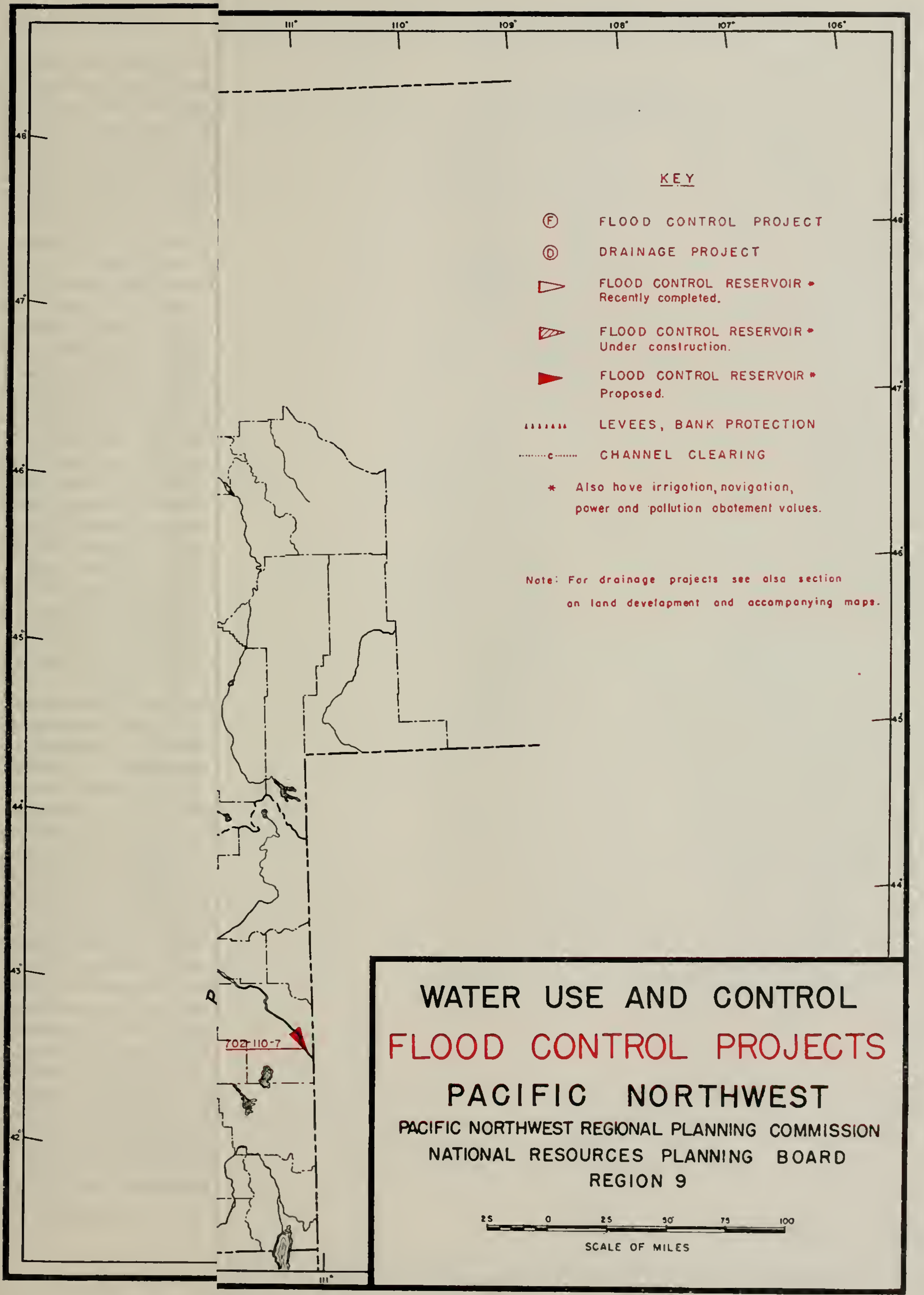
SCALE OF MILES

WATER USE AND CONTROL
FLOOD CONTROL PROJECTS
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9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Ⓓ DRAINAGE PROJECT
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▨ FLOOD CONTROL RESERVOIR * Under construction.
▶ FLOOD CONTROL RESERVOIR * Proposed.
LEVEES, BANK PROTECTION
c CHANNEL CLEARING
* Also have irrigation, navigation, power and pollution abatement values.
Note: For drainage projects see also section on land development and accompanying maps.
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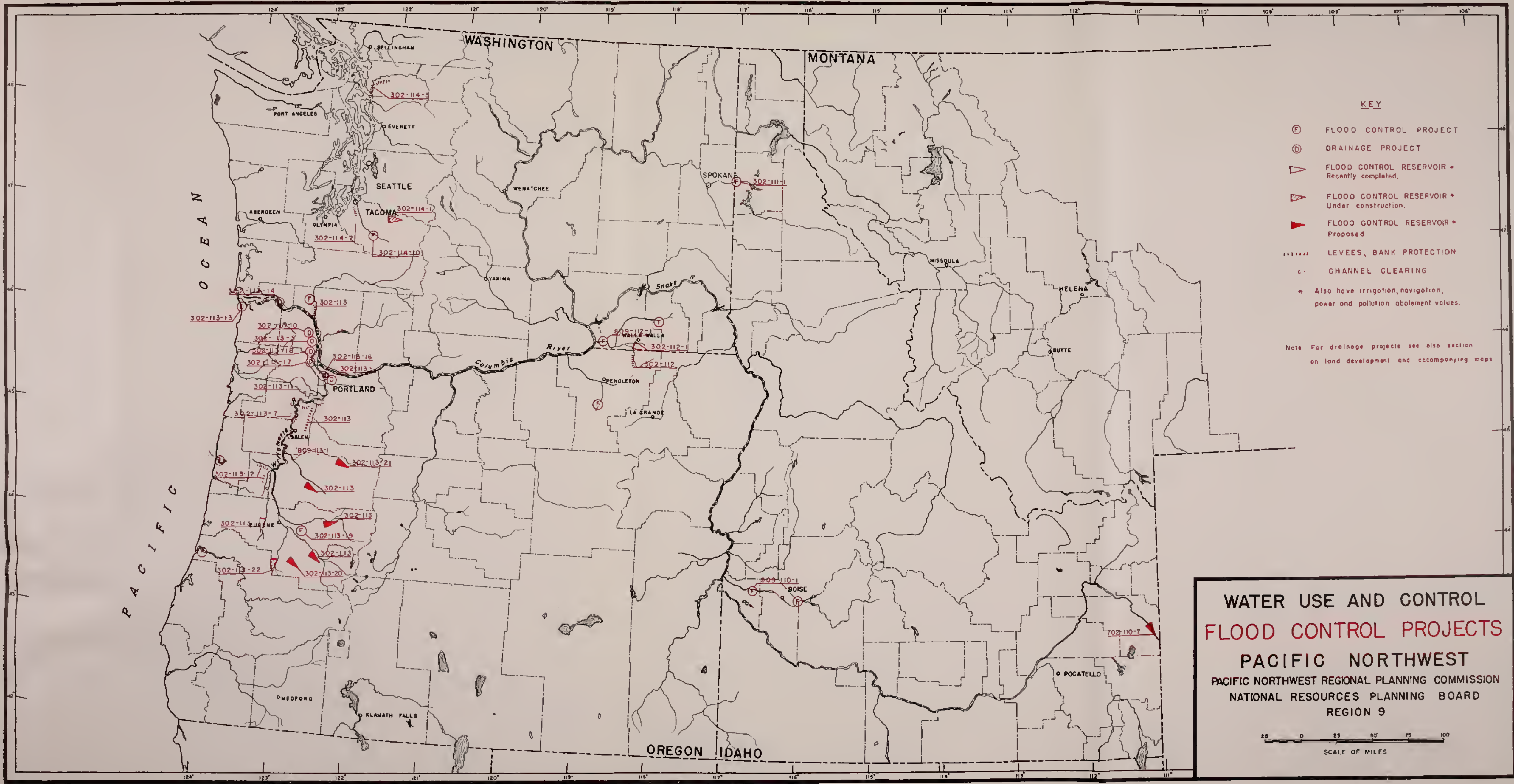
SCALE OF MILES

WATER USE AND CONTROL
FLOOD CONTROL PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

444553—42 (Face p. 148) No. 2


WATER USE AND CONTROL
FLOOD CONTROL PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
25 0 25 50 75 100
KEY
Ⓕ FLOOD CONTROL PROJECT
Ⓓ DRAINAGE PROJECT
FLOOD CONTROL RESERVOIR * Recently completed.
FLOOD CONTROL RESERVOIR * Under construction.
FLOOD CONTROL RESERVOIR * Proposed
LEVEES, BANK PROTECTION
c· CHANNEL CLEARING
* Also have irrigation, navigation, power and pollution abatement values.
Note For drainage projects see also section on land development and accompanying maps
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC
OCEAN
Columbia River
Snake R.
Willamette R.
BELLINGHAM
PORT ANGELES
EVERETT
SEATTLE
TACOMA
OLYMPIA
ABERDEEN
WENATCHEE
YAKIMA
SPOKANE
WALLA WALLA
PENDLETON
LA GRANDE
PORTLAND
SALEM
EUGENE
MEDFORD
KLAMATH FALLS
BOISE
POCATELLO
MISSOULA
HELENA
BUTTE
302-114-3
302-114-1
302-114-2
302-114-10
302-111-1
302-113-14
302-113-13
302-113
302-113-10
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302-113-18
302-113-17
302-113-16
302-113-11
302-113-7
809-113-1
302-113-21
302-113-12
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302-112
809-110-1
702-110-7
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114° 113° 112° 111° 110° 109° 108° 107° 106°
49° 48° 47° 46° 45° 44° 43° 42°

FIGURE 56.

an estimated damage of about $4 000,000 each. Still higher floods have occurred at greater intervals, such as in 1861, 1881, and 1890. During the largest flood on record, in 1861, nearly 500 square miles of valley floor were inundated. It has been estimated that should a flood of the 1861 magnitude occur now it would inundate 7,000 farm units, including 3,000 farm, village and suburban homes and buildings, and in addition partially inundate 18 cities and towns. Certain communities, such as Cottage Grove, Junction City, Harrisburg, and West Salem, would be entirely inundated, in some cases to a depth of 13 feet.[15] In order to provide adequate protection from damaging floods in the highly populated Willamette Valley, bank revetment and channel clearing in the flood zone, and storage reservoirs in the foothill areas are required.

Continuing Federal appropriations have been made for construction and maintenance of such flood-control devices as levees, dikes, and revetments along portions of the banks of the lower Columbia and its tributaries, including the Willamette. Several proposed projects of this continuing type are in harmony with the general plan for control of lower Columbia-Willamette floods.

Many comprehensive investigations and reports on the Willamette River and its basin have been made by the Corps of Engineers and other Federal departments, as well as by State and local authorities. These reports, dating in some instances from 1871, have had to do not only with flood control, but with navigation, power, stream pollution, and supplementary irrigation. Since the passage of the Flood Control Act of 1936, the Corps of Engineers and Department of Agriculture have reported on the Willamette River as regards run-off, flood control, and soil erosion prevention. Pursuant to recommendations of the Chief of the Corps of Engineers, in 1938, to provide for construction of seven foothill reservoirs for regulation of stream flow, primarily in the interests of flood control, with additional benefits in navigation, incidental power, irrigation, and the reduction of stream pollution, at an estimated total cost of $62,300,000, Congress has made initial appropriations toward this work. Two of the seven reservoirs authorized, the Dorena and the Cottage Grove projects, are under construction; one, the Fern Ridge reservoir, is completed. This comprehensive project, when completed in its entirety, will afford flood protection to 270,000 acres that are now frequently inundated. This project as a whole is not only of major import to the Willamette Valley, but it is of great significance to the development of the entire Pacific Northwest region.

Local, channel improvement projects are required for some tributaries, notably Pudding River.

Puget Sound Basin.—Flood control is the most urgently needed hydraulic work in the Puget Sound basin. The western slopes of the precipitous Cascade Range, an area of high rainfall and deep snows, frequently produce torrential run-offs, which spread out as they reach the more gently sloping plains adjacent to Puget Sound. Here, considerable damage is done by inundation and erosion, particularly in and around the cities and towns located at or near the mouths of the streams.

The Puget Sound basin is the most densely populated area in the Pacific Northwest, and hence substantial property values are hazarded by the frequent floods of the Skagit, Green, Puyallup, White, Snohomish, Nooksack, and Stillaguamish rivers. More than 150,000 acres are subject to flooding from these rivers, and estimated annual damage is nearly a million dollars. Protection works have heretofore been largely confined to the lower, tidal sections of the rivers and have consisted of dikes, drainage ditches, and revetments. It is roughly estimated that such expenditures have totalled about $10,000,000. The Puget Sound basin lacks, in contrast to the Willamette Valley, properly located, low-cost sites for large capacity flood control reservoirs. An exception is the Mud Mountain site on the White River.

A most serious flood control problem in this basin is that of the Puyallup River and its tributary, the White River, whose frequent floods are a menace to the Puyallup Valley and the City of Tacoma. The record flood, in 1933, caused damage estimated at $950,000. Mud Mountain Dam on the White River, now under construction and nearing completion by the Corps of Engineers, is designed to protect this area. In addition to the Mud Mountain Dam and reservoir project, a project has been adopted by the Congress for the improvement of the Puyallup River channel at Tacoma for flood protection.

Another major project developed by the Corps of Engineers provides for floodway and bank revetment work in the lower Skagit River.

Coast Basins of Oregon and Washington.—In the coast basins of Oregon and Washington, the principal flood control problems are found at the mouths of the rivers discharging into the bays and harbors of the Pacific Ocean, where tidal lands of agricultural and industrial value are inundated and eroded.

In the Washington Coast basin, the most serious flood damage has been along the rivers entering Gray's Harbor. In 1933, the Chehalis River valley experienced an exceptional flood, which inundated 75,000 acres, including part of the City of Centralia, and caused damage estimated at over $400,000.

Flood problems of the Oregon Coast basin have not been serious, and are confined to the tidal areas along the lower reaches of the streams. The total flood area

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[15] *Willamette Valley Project*, U. S. Army Corps of Engineers, 1940, p. 5.

an estimated damage of about $4 000,000 each. Still higher floods have occurred at greater intervals, such as in 1861, 1881, and 1890. During the largest flood on record, in 1861, nearly 500 square miles of valley floor were inundated. It has been estimated that should a flood of the 1861 magnitude occur now it would inundate 7,000 farm units, including 3,000 farm, village and suburban homes and buildings, and in addition partially inundate 18 cities and towns. Certain communities, such as Cottage Grove, Junction City, Harrisburg, and West Salem, would be entirely inundated, in some cases to a depth of 13 feet.[15] In order to provide adequate protection from damaging floods in the highly populated Willamette Valley, bank revetment and channel clearing in the flood zone, and storage reservoirs in the foothill areas are required.

Continuing Federal appropriations have been made for construction and maintenance of such flood-control devices as levees, dikes, and revetments along portions of the banks of the lower Columbia and its tributaries, including the Willamette. Several proposed projects of this continuing type are in harmony with the general plan for control of lower Columbia-Willamette floods.

Many comprehensive investigations and reports on the Willamette River and its basin have been made by the Corps of Engineers and other Federal departments, as well as by State and local authorities. These reports, dating in some instances from 1871, have had to do not only with flood control, but with navigation, power, stream pollution, and supplementary irrigation. Since the passage of the Flood Control Act of 1936, the Corps of Engineers and Department of Agriculture have reported on the Willamette River as regards run-off, flood control, and soil erosion prevention. Pursuant to recommendations of the Chief of the Corps of Engineers, in 1938, to provide for construction of seven foothill reservoirs for regulation of stream flow, primarily in the interests of flood control, with additional benefits in navigation, incidental power, irrigation, and the reduction of stream pollution, at an estimated total cost of $62,300,000, Congress has made initial appropriations toward this work. Two of the seven reservoirs authorized, the Dorena and the Cottage Grove projects, are under construction; one, the Fern Ridge reservoir, is completed. This comprehensive project, when completed in its entirety, will afford flood protection to 270,000 acres that are now frequently inundated. This project as a whole is not only of major import to the Willamette Valley, but it is of great significance to the development of the entire Pacific Northwest region.

Local, channel improvement projects are required for some tributaries, notably Pudding River.

Puget Sound Basin.—Flood control is the most urgently needed hydraulic work in the Puget Sound basin. The western slopes of the precipitous Cascade Range, an area of high rainfall and deep snows, frequently produce torrential run-offs, which spread out as they reach the more gently sloping plains adjacent to Puget Sound. Here, considerable damage is done by inundation and erosion, particularly in and around the cities and towns located at or near the mouths of the streams.

The Puget Sound basin is the most densely populated area in the Pacific Northwest, and hence substantial property values are hazarded by the frequent floods of the Skagit, Green, Puyallup, White, Snohomish, Nooksack, and Stillaguamish rivers. More than 150,000 acres are subject to flooding from these rivers, and estimated annual damage is nearly a million dollars. Protection works have heretofore been largely confined to the lower, tidal sections of the rivers and have consisted of dikes, drainage ditches, and revetments. It is roughly estimated that such expenditures have totalled about $10,000,000. The Puget Sound basin lacks, in contrast to the Willamette Valley, properly located, low-cost sites for large capacity flood control reservoirs. An exception is the Mud Mountain site on the White River.

A most serious flood control problem in this basin is that of the Puyallup River and its tributary, the White River, whose frequent floods are a menace to the Puyallup Valley and the City of Tacoma. The record flood, in 1933, caused damage estimated at $950,000. Mud Mountain Dam on the White River, now under construction and nearing completion by the Corps of Engineers, is designed to protect this area. In addition to the Mud Mountain Dam and reservoir project, a project has been adopted by the Congress for the improvement of the Puyallup River channel at Tacoma for flood protection.

Another major project developed by the Corps of Engineers provides for floodway and bank revetment work in the lower Skagit River.

Coast Basins of Oregon and Washington.—In the coast basins of Oregon and Washington, the principal flood control problems are found at the mouths of the rivers discharging into the bays and harbors of the Pacific Ocean, where tidal lands of agricultural and industrial value are inundated and eroded.

In the Washington Coast basin, the most serious flood damage has been along the rivers entering Gray's Harbor. In 1933, the Chehalis River valley experienced an exceptional flood, which inundated 75,000 acres, including part of the City of Centralia, and caused damage estimated at over $400,000.

Flood problems of the Oregon Coast basin have not been serious, and are confined to the tidal areas along the lower reaches of the streams. The total flood area in the Oregon Coast basin is estimated at approximately 63,000 acres and the annual damage at less than $100,000.

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[15] *Willamette Valley Project*, U. S. Army Corps of Engineers, 1940, p. 5.

Studies of the flood control problems of the major streams of the Oregon and Washington Coast basins have been undertaken by the Corps of Engineers and the Department of Agriculture.

Drainage Basins East of the Cascades.—There is no general flood-control problem in that portion of the Pacific Northwest region east of the Cascade Mountains. Since the Columbia and its principal tributaries in this area flow quite generally in deeply cut canyons, comparatively little damage occurs along most reaches. However, serious local flood conditions requiring control exist on several streams, including the Spokane, Flathead, Kootenai, Coeur d'Alene, and Yakima rivers in the upper Columbia basin; the Boise and upper Snake rivers in the Snake basin; Mill Creek; and the Umatilla and Touchet rivers in the middle Columbia basin.

On the Kootenai River in Idaho, valuable agricultural lands between Bonner's Ferry and the Canadian border require protection against flood damage. Here, some 22,000 acres of fertile alluvial bottom land have been reclaimed by diking and drainage. Frequent floods have overtopped the dikes and inundated the farms. Effective control of the floods can best be obtained by regulation of Kootenai Lake, in Canada, which requires international cooperation.

The Boise River in the vicinity of Boise has frequently flooded a limited area of agricultural lands and eroded urban and rural lands. The multiple-purpose Anderson Ranch Dam now under construction on the South Fork of the Boise River, although primarily for irrigation, will aid in solving this flood control problem.

In 1903, at Heppner, Oregon, a torriential flood in Willow Creek resulted in one of the greatest losses of life from such causes in the history of the United States.

The Mill Creek project, involving an earth-fill dam and appurtenant structures, now nearing completion by the Corps of Engineers, in the vicinity of Walla Walla, Washington, provides for the protection of that city and surrounding farm lands against damaging floods, which have occurred in the Walla Walla basin 15 times since 1878.

A flood-control project is proposed by the Corps of Engineers for construction of levees and channel improvements on the Walla Walla River in the vicinity of Milton and Freewater, Oreg., where annual damages are of the order of $45,000.

Severe damage has been experienced from floods in the Spokane River and tributaries, principally in Idaho, and local flood protection improvements have been made at several critical locations during the past several years.

Continuing surveys, investigations, and studies of the flood-control problems of the streams east of the Cascade Mountains are needed.

Significant Federal Flood Control Projects

AS SUBMITTED BY THE CORPS OF ENGINEERS, U. S. A.

Name and location	Amount necessary to complete	Status of plans;[1] remarks
Birch Creek, Oreg	$37,000	General design drawings for channel improvement at Pilot Rock.[2]
Boise River, Idaho	400,000	General design plan for modification o control gates at Arrowrock Dam.
Cowlitz River, Wash	31,000	General design drawings for raising and strengthening levees at Castle Rock.[2]
Pudding River, Oreg	62,000	General design drawings for channel and bank clearing.[2]
Skagit River, Wash		Avon by-pass.[2 3]
Yaquina River, Oreg	72,000	General design drawings for levee closures of Boones and Nutes Sloughs.[2]
Tacoma, Puyallup River, Wash.	1,600,000	Approved plans are available for channe improvement in Tacoma.[2]
Touchet River, Wash	156,000	General design drawings for levees and channel improvement at Dayton.[2]
Tualatin River, Oreg		(2 3).
Umpqua River, Oreg	176,000	General design drawings for levees near Reedsport and six other areas.[2]
Walla Walla River, Oreg	587,000	General design drawings for levees in 7-mile stretch of river through Milton and Freewater [2]
Willamette Valley project, Oreg.	65,400,000	Remaining 5 dams of the 7-dam coordinated plan for multiple-purpose foothill reservoirs. General design drawings available for the Lookout Point, Quartz Creek, and Sweet Home Dams, while complete drawings are available for Detroit and Dorena Dams. Project also has irrigation, power, navigation and pollution abatement values.[2]

[1] Recommended to Congress for authorization of construction when funds are available.

[2] Authorized by Congress for construction when funds are available.

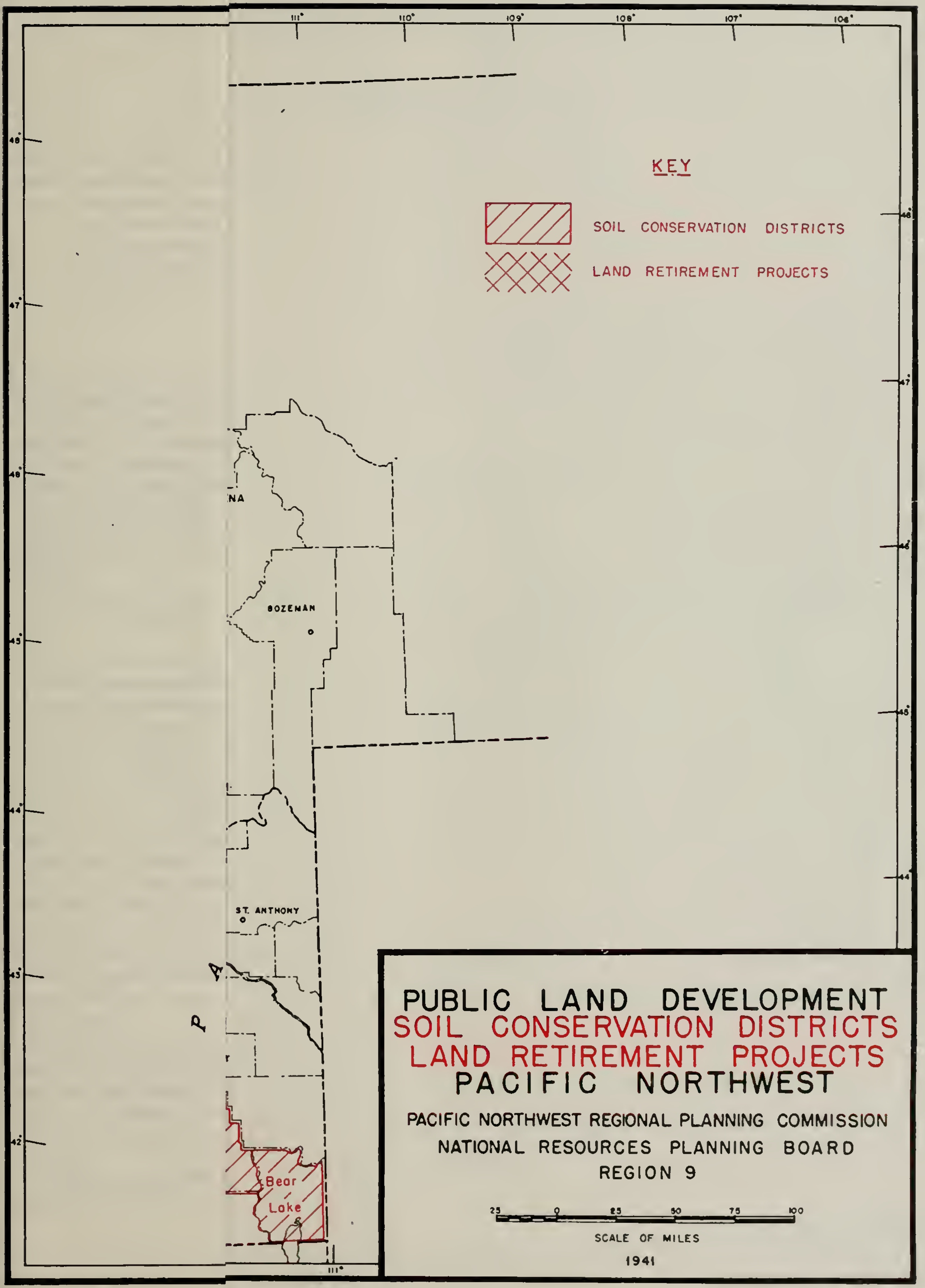
[3] Review of project now under way.

Water and Soil Conservation

Beyond the major works of flood and erosion control through water storage and bank protection, there are large related fields in the conservation of little waters and in the prevention of soil erosion by water and wind.

Such programs affect all parts of the region—particularly its rural and wild areas. Although the available work is rather difficult to program in project form, its aggregate bulk and importance are very large. The public part of this program has been, to a considerable extent, experimental and demonstration work, but it is expanding to include governmental assistance to cooperative conservation districts. Important to effective accomplishment of a broad program are extensive public planning and engineering work and public technical, financial, and organizational aids for the local agencies, district organizations, and individuals that must carry much of the program into practice. Many agencies—including Federal agricultural, grazing, forest, soil conservation, and reclamation bureaus, corresponding State offices, and local districts and individual landowners—are concerned in various programs.

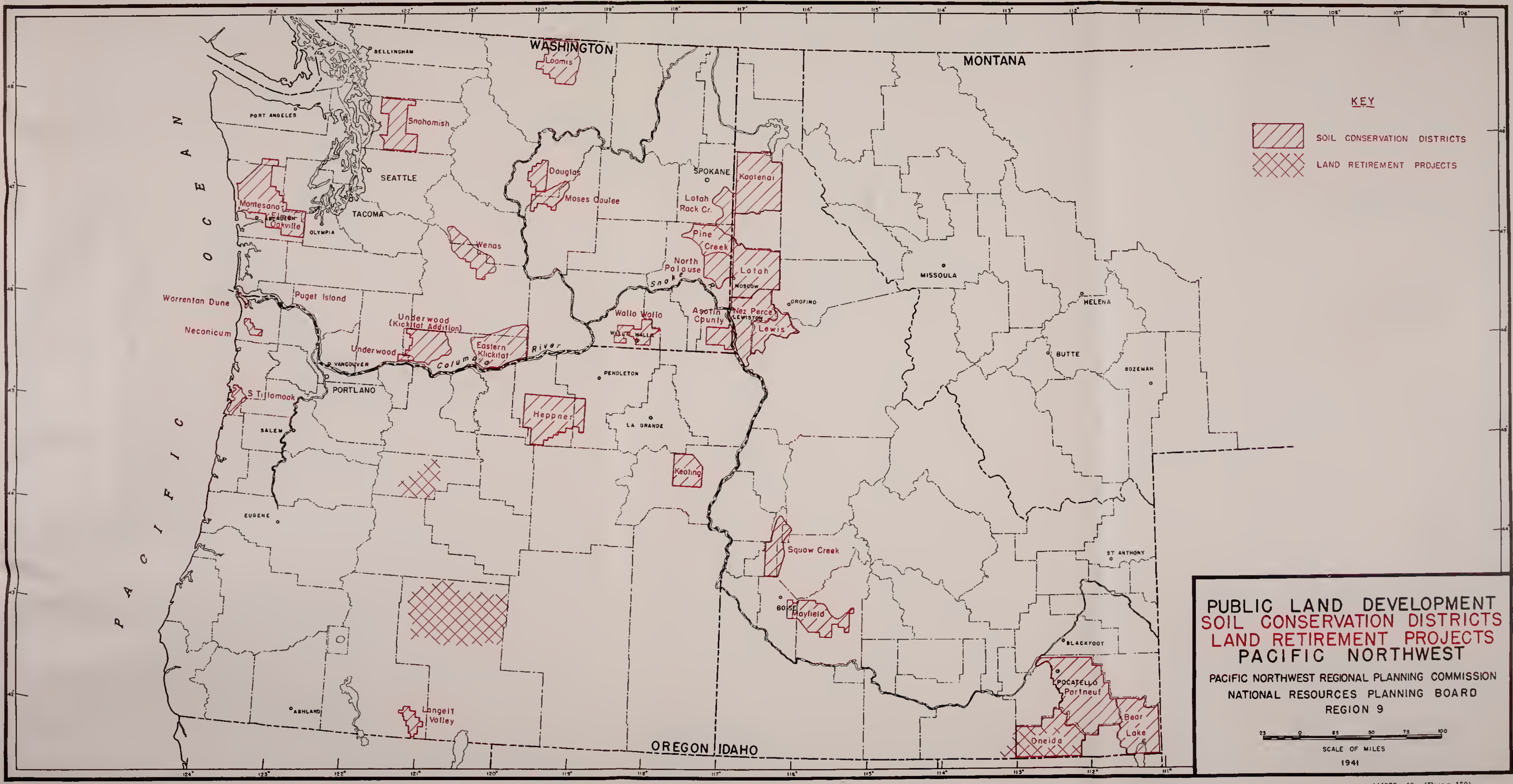
Illustration of the potential extent of work in this category is afforded by a survey, made by an Inter-



PUBLIC LAND DEVELOPMENT
SOIL CONSERVATION DISTRICTS
LAND RETIREMENT PROJECTS
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941


PUBLIC LAND DEVELOPMENT
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PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

FIGURE 57.

Significant Federal Water and Soil Conservation Projects

AS SUBMITTED BY THE DEPARTMENT OF AGRICULTURE

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
809-110-1	Boise River, Idaho	$800,800	Proposed improvement works for run-off and water flow retardation and soil erosion control. Desirable but not immediately necessary.
809-112-1	Walla Walla River, Washington and Oregon	1,000,000	Proposed improvement works for run-off and water flow retardation and soil erosion control. Not immediately necessary.
809-113-1	Willamette River, Oregon	5,000,000	Do.
	LAND RETIREMENT PROJECTS		
	Central Oregon, Madras, Oregon	$120,090	Retirement of cultivated land and development of grazing areas. Under construction, should be completed.
	Fort Rock, Lakeview, Oregon	95,060	Retirement of cultivated land and development of grazing areas. Under construction, should be completed.
	Southeastern Idaho, Malad, Idaho	69,350	Retirement of cultivated land and development of grazing areas. Under construction, should be completed.

Bureau Coordinating Committee of the U. S. Department of Agriculture, covering a somewhat larger field in which this type of work is included, for a rural-conservation works program, including rural soil, water, and forest conservation, which estimated that there were required in the four Pacific Northwest States some 92 million man-days of labor. The estimated number of man-days of labor available (annually) from unemployed and low-income rural workers was 16 million (as of 1937).[16]

Potential work in this field involves a number of agencies, as indicated, and several general classes of work.

In agricultural areas, it includes both extensive governmental and governmentally assisted conservation districts, and cooperative demonstration and work projects in the control of water and wind erosion, in restoration of cover, in conservation of water, in improvement of domestic and irrigation water supplies, and in rehabilitation of soils. In the latter connection, correlated private or cooperative projects might well provide for the production and distribution of suitable fertilizers in adequate quantities and at lower costs.

In grazing areas, extensive range conservation programs will involve such projects as fire-control systems and equipment; truck trails; water conservation measures including reservoirs and ponds, flood-irrigation works, spring development, wells; reseeding; stock-trail markers; fencing; rodent-control systems; administrative facilities.

In forest areas, also, there is a wide range of potential conservation work, including fire protection, watershed protection, restoration of cover, water conservation or storage, and related projects.

In determining these conservation needs, the process of area analysis, referred to at the beginning of this section of the report, will be especially valuable.

The list of definite projects in this general field is still small. The accompanying table includes several projects in operation and under consideration by the Department of Agriculture.

Irrigation[17]

Irrigation in the Pacific Northwest is one of the most important factors in assuring economic opportunity and security for an increasing population of the region. Without it, much of the agriculture in the area east of the Cascade Mountains could hardly progress beyond the pastoral stage. With it, the productivity and security of agriculture west of the Cascades can be materially increased. East of the Cascade Mountains, where precipitation is sparse, irrigation dominates agricultural production. West of the Cascades, supplemental irrigation is increasingly being applied during the dry summer months, in order to secure increased yields and improved quality of crops.

From both national and regional standpoints, there is ample justification for the reclamation of suitable new croplands at a reasonable rate. The need for such development in the Pacific Northwest is increased by reason of industrial expansion now taking place.

Well-conceived irrigation projects are particularly effective in strengthening the regional economy—in creating new public and private wealth and economic activity, and in increasing and stabilizing production, employment, and purchasing power.

New reclamation is practicable in a few large and a number of small projects. In a number of areas now under irrigation, supplemental water supplies are urgently needed.

Snake River Basin.—A most urgent problem of the Snake drainage basin is that of supplemental water for

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[16] "A Need for Work, a Need for Workers," Raymond C. Smith, in *Land Policy Review*, Bureau of Agricultural Economics, U. S. D. A., May–June 1940.

[17] See Part II of this report.

Significant Federal Water and Soil Conservation Projects

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New reclamation is practicable in a few large and a number of small projects. In a number of areas now under irrigation, supplemental water supplies are urgently needed.

Snake River Basin.—A most urgent problem of the Snake drainage basin is that of supplemental water for some 2 million acres already under irrigation—much of which area is subject to recurring water shortages resulting in a loss of millions of dollars through curtailment of production and actual destruction of growing crops. Several additional reservoirs are needed to serve existing projects in the basin. In most instances, these new reservoirs will not only insure an adequate water supply to lands now under irrigation, but will provide for bringing substantial adjacent areas under cultivation.

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[16] "A Need for Work, a Need for Workers," Raymond C. Smith, in *Land Policy Review*, Bureau of Agricultural Economics, U. S. D. A., May–June 1940.

[17] See Part II of this report.

In the upper Snake River basin, where there are about 1,200,000 acres of irrigated lands, water shortages have occurred in 11 out of 40 years, and in 3 of these years, the shortages were exceptionally severe. The Bureau of Reclamation has recently completed the Island Park and the Grassy Lake Reservoirs, to provide supplemental water to irrigation districts and canals in the area from Rexburg to Ashton, Idaho. Further to improve the situation, a high dam at Grand Valley (or Palisades) site on the Snake River near Irwin, with 1,000,000-acre-foot storage capacity, is under study. This project will provide for required supplemental irrigation water and also for flood control and power development. Such a project is in harmony with a well-coordinated plan of development for the basin.

In the Boise, Payette, and Weiser valleys of southwestern Idaho, approximately 450,000 acres of land are now under irrigation; over half of this area is subjected to frequent shortages of water. In the Boise valley, during the 16 years 1924 to 1939, inclusive, there were only 4 in which adequate water was available. In the Weiser and Payette valleys, there is also urgent need for supplemental water.[18] Run-off of the Payette watershed, if conserved, is ample to water the irrigable lands in the Payette Valley, with an excess available for diversion to the Boise River basin.

As units in the ultimate solution of the irrigation problems of southwestern Idaho, the Bureau of Reclamation has developed, or has under development, a series of projects:

A major project, recently approved by Congress, is the Anderson Ranch Reservoir, on the South Fork of the Boise River about 25 miles above the existing Arrowrock Dam of the Boise project. This will be a multiple-purpose reservoir (capacity 500,000 acre-feet) for irrigation, power, flood, and silt control.

Continuation of work on the Payette division of the Boise project, including the construction of the Cascade reservoir on the North Fork of the Payette, is required as an important unit in the program for furnishing supplemental water for southwestern Idaho, and for irrigating 50,000 acres of additional land.

The Weiser storage project, now taking form, will consist of two or more reservoirs on streams tributary to the Weiser River to furnish supplemental water to existing irrigation canals now serving 30,000 acres.

The proposed Twin Springs Reservoir on the North Fork of the Boise River should be an important unit in the ultimate storage development of the area, although its construction may be deferred pending further development of comprehensive plans for the area.

East of the Boise project lands is an area of a million or more acres of irrigable land to which no appreciable amount of water has been brought. Included is the so-called Mountain Home area, consisting of about 400,000 acres of virgin sagebrush land. Development of this area is currently under study by the Bureau of Reclamation. Both the Anderson Ranch Reservoir and the Twin Springs Reservoir can be considered as units of the ultimate plan to irrigate this undeveloped middle section of southern Idaho.

Approximately 18,300 square miles of eastern Oregon is contained within the Snake River drainage basin.[19] Much of this area has suffered for many years from a shortage of irrigation water. Irrigation districts and companies have developed limited irrigated areas in the valleys of certain streams. In 1932, the Bureau of Reclamation completed the Owyhee Dam, providing storage of 715,000 acre-feet, and subsequently has carried forward the Owyhee irrigation project. The project, with a total estimated cost of $18,500,000, is now complete with the exception of a relatively small amount of work on canals and laterals. Completion will have provided supplemental water for 45,000 acres, in addition to bringing in 65,000 acres of new lands.

The Bureau of Reclamation has prepared plans for a reservoir at Bully Creek, Oreg., capacity 20,000 acre-feet, with a pumping plant and laterals near Brogan, to provide supplemental water for 7,000 acres and to serve a new area of 3,000 acres.

The Bureau of Indian Affairs has recommended completion of the Duck Valley project, serving 15,000 acres on the Western Shoshone Reservation, Owyhee County, Idaho. It has also recommended the Gray's Lake reservoir project on the Fort Hall Reservation, Idaho. The Fort Hall project, approximately 85 percent complete, involves irrigation of over 60,000 acres.

Small water conservation projects are necessary in many arid parts of the region for irrigation, grazing, and stock watering. Many small communities are dependent upon the unregulated flow of creeks and small streams. This is particularly true of the area within the Snake River basin, and the State of Idaho has submitted a list of proposed small reservoir projects for that location, many of which should be considered for construction under the Wheeler-Case and Water Facilities acts, for Federal aid in the construction of small projects.

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[18] *An Economic Survey of Idaho,* Idaho State Planning Board, 1940, pp. 48, 61.

[19] *Land Development in Oregon,* Oregon State Planning Board, 1938, p. 6.

Upper Columbia Drainage Basin.—The upper Columbia drainage basin, including the watersheds of the Columbia River above the mouth of the Snake, embraces large areas of Montana, Idaho, and Washington (as well as of Canada). Fertile valleys and prairies devoted to irrigated or dry-farming agriculture are scattered through the mountainous rims of this basin. Within the great bend of the upper Columbia River, there is an area of 2 or 3 million acres of broad plain, now quite largely semidesert, which will be irrigated in considerable part under the Columbia Basin (Grand Coulee) project. The major irrigation problems are provision of supplemental water for existing projects and the development of large new irrigated areas.

The major project is the Columbia Basin project, since 1933 under construction by the Bureau of Reclamation, with the main dam and initial power units nearing completion. This multiple-purpose project involves irrigation and power pirmarily, with subsidiary benetfis in navigation and flood control. Irrigation will cover approximately 1,200,000 acres of fertile land. Land surveys are practically complete, joint investigations looking toward orderly development and settlement of the area are under way, and canal studies are in progress, but construction work on the irrigation part of the project has not been begun. Continuing appropriations are required to permit the early construction of the pumping plant and the distribution reservoir in the Grand Coulee, and to begin work on main canals and laterals for the irrigation units.

The Yakima project, which has brought into use the largest existing irrigation district in the basin, has been in operation about 25 years. The Roza division, an extension of this project involving 72,000 acres, is now being constructed by the Bureau of Reclamation to meet demands for additional acreage. Work should be continued to complete main and lateral canals, power plant, transmission lines, pumping plant, and drains of this project.

The Bureau of Indian Affairs has under construction the Flathead project in western Montana. There is urgent need for completion of this project, since agricultural development has advanced beyond construction, resulting in serious water shortages and crop losses. Required work includes betterment of existing canal and laterals, new laterals, and pumping plants.

The Bureau of Indian Affairs has recommended completion of extensions to its Wapato project on the Yakima River, Washington, an old and successful project. The extensions will bring some 18,000 additional acres under cultivation.

The Klickitat project in Washington is also proposed by the Indian Bureau to provide for irrigation of additional lands in the Yakima Reservation and, incidentally, for production of power with revenues estimated at $213,000 annually.

The Bureau of Reclamation has under investigation the Rathdrum Prairie project to irrigate about 40,000 acres in the vicinity of Coeur d'Alene, Idaho, and Spokane, Wash., where there is a considerable and growing demand for irrigated land. The present proposal involves pumping water from Lake Coeur d'Alene, using power from Grand Coulee.

In the upper Columbia basin, particularly in western Montana, there are a number of potential small reservoir projects for improvement or stabilization of irrigation. Some of these would be suitable for consideration under Wheeler-Case or Water Facilities acts. The State Water Conservation Board of Montana has investigated and proposed a number of such projects.

Middle Columbia Drainage Basin.—The middle Columbia basin, including drainage between the mouth of the Snake River and Bonneville Dam, contains great areas of sloping plateau lands, used largely for grazing and dry farming. Irrigation is largely confined to tributary river valleys such as the Umatilla and Deschutes. Some of the irrigation projects in this basin are among the oldest in the West (one on the Walla Walla River had its beginnings over 100 years ago, while irrigation was practiced near The Dalles as early as 1853).

Four of the proposed multipurpose dams of the Corps of Engineers' comprehensive plan for the main stem of the Columbia, namely those at Umatilla Rapids, John Day Rapids, Arlington, and The Dalles, will ultimately produce incidental benefits to irrigation in the mid-Columbia region. Along the north and south sides of the river, within this reach, are approximately 375,000 acres of land which may, in time, be irrigated by pumping.

The Bureau of Reclamation now has under construction extensions to the Deschutes project, consisting of the Crane Prairie and Wickiup storage reservoirs, canals, and laterals. Continuation of this project, to provide for the irrigation of 50,000 acres in the vicinity of Madras, Oreg., is called for.

The Bureau of Reclamation has planned and recommended construction of the Crooked River project in the Deschutes basin, including the Post reservoir and accessory works.

The Bureau has also prepared plans for a small project on Beaver Creek in Crook County, Oreg.

Significant or Typical Irrigation Projects

FEDERAL PROJECTS, AS SUBMITTED BY THE BUREAU OF RECLAMATION

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
702-110-1	Anderson Ranch Reservoir, Boise project, Idaho	$12,578,000	Important unit in comprehensive plan for development of land and water resources of Southwest Idaho. Construction should proceed.
702-110-2	Payette division, Cascade Reservoir canals and laterals, Boise project, Idaho.	4,013,000	Continuation of a going project of importance to regional plan. Brings water to 50,000 additional acres.
702-110-4	Owyhee project—Oregon—laterals	390,000	Completion of work underway. Desirable.
702-110-6	Vale-Brogan extension, Bully Creek Reservoir, Oregon	900,000	Plans completed. Provides needed extension to existing project.
702-110-7	South Fork storage project, Idaho—Grand Valley Reservoir.	15,000,000	Plans completed. Important in conservation of water in Upper Snake area.
702-110-8	Mann Creek project, Weiser, Idaho	1,025,000	Plans completed. Wheeler-Case type project. Required to provide supplemental water to existing irrigation canals.
702-110-9	Medicine Lodge project, Idaho	513,000	Plans completed. Wheeler-Case type project. Part of well-coordinated system of small reservoirs.
702-110-10	Clear Creek project, Oregon	130,000	Plans in preparation. Wheeler-Case type project. Part of well-coordinated system of small reservoirs.
702-110-11	Norwood project, Idaho	375,000	Plans nearing completion. This will enlarge existing reservoir. Wheeler-Case type project.
702-110-12	Council project, Idaho	750,000	Plans in preparation. Wheeler-Case type project. Part of a well-coordinated plan of small reservoirs.
702-110-13	Cambridge Bench project, Idaho	375,000	Do.
702-110-14	Lewiston Orchard project, Idaho	950,000	Do.
702-110-15	Mesa project, Idaho	300,000	Do.
702-110-	Twin Springs Reservoir project, Boise project, Idaho.	9,150,000	Plans not drawn. An important unit in the ultimate irrigation development of the area. Construction may be deferred pending completion of Anderson Dam.
702-111-1	Roza division—Yakima project, Washington	6,565,000	Completion of project.
702-111-2	Columbia basin project, irrigation features, Washington	227,342,000	One of most important units in regional development. Grand Coulee Dam will be completed in fall of 1941. Irrigation construction should be started.
702-111-3	Yakima project—Sunnyside division, Washington	100,000	Reconstruction of old structures. Desirable.
702-111-4	Missoula Valley project, Montana	110,000	Plans completed. Wheeler-Case type project.
702-111-5	Rathdrum Prairie project, Idaho	600,000	Plans in preparation.
702-112-1	Deschutes project, Oregon	4,894,000	Completion of project.
702-112-2	Crooked River project, Oregon	1,821,000	Plans completed. Provides supplemental water to the existing Ochocho irrigation district where water is inadequate. Ready and desirable.
702-112-3	Beaver Creek Reservoir, Crook County, Oreg	120,000	Plans completed. Wheeler-Case type project.
702-113-1	Canby project, Oreg	448,000	Plans completed. Will bring supplemental irrigation to 4,300 acres.

FEDERAL PROJECTS, AS SUBMITTED BY THE CORPS OF ENGINEERS

702-113-	Willamette Valley project	($10,380,000)	Water storage project, primarily for flood control, with additional benefits for irrigation; approximate cost chargeable to irrigation $10,380,000 (of total of $62,300,000). Basic project under construction by Corps of Engineers.

FEDERAL PROJECTS, AS SUBMITTED BY THE BUREAU OF INDIAN AFFAIRS

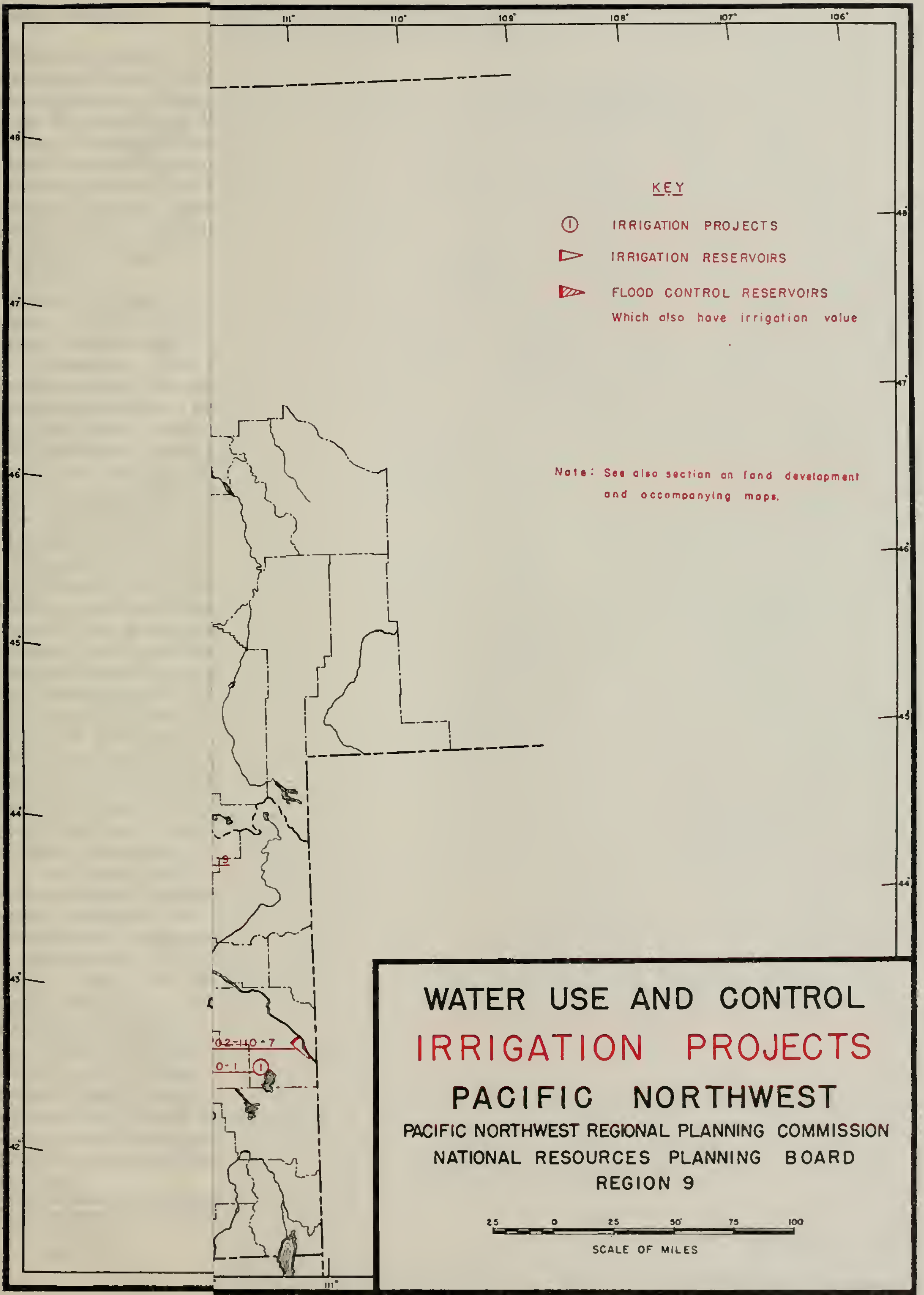
706- 9-1	Colville Reservation project, Washington	$10,000	Required to complete a project of total estimated cost of $308,597.
706- 16-1	Flathead project, Montana	575,000	Completion and betterment of important project. Should proceed.
706- 20-1	Gray's Lake project, Fort Hall, Idaho	382,000	Completion of a project now 85 percent complete. Reservoir project requires further study.
706- 76-1	Warm Springs project, Oregon	72,000	Provides for gradual completion of a small irrigation project, total cost $121,935.
706- 77-1	Western Shoshone—Duck Valley project, Idaho	477,430	Provides for completion of a project now 60 percent finished.
706- 80-1	Yakima (Wapato) project, Washington	11,700,000	Provides for continuation of project now 32 percent complete. Plans ready.
706-	Klickitat project, Washington	10,910,000	Involves transmountain diversion of water; further studies necessary as to water rights, power development, and sale, etc.

STATE PROPOSALS, IDAHO—SMALL RESERVOIR PROJECTS

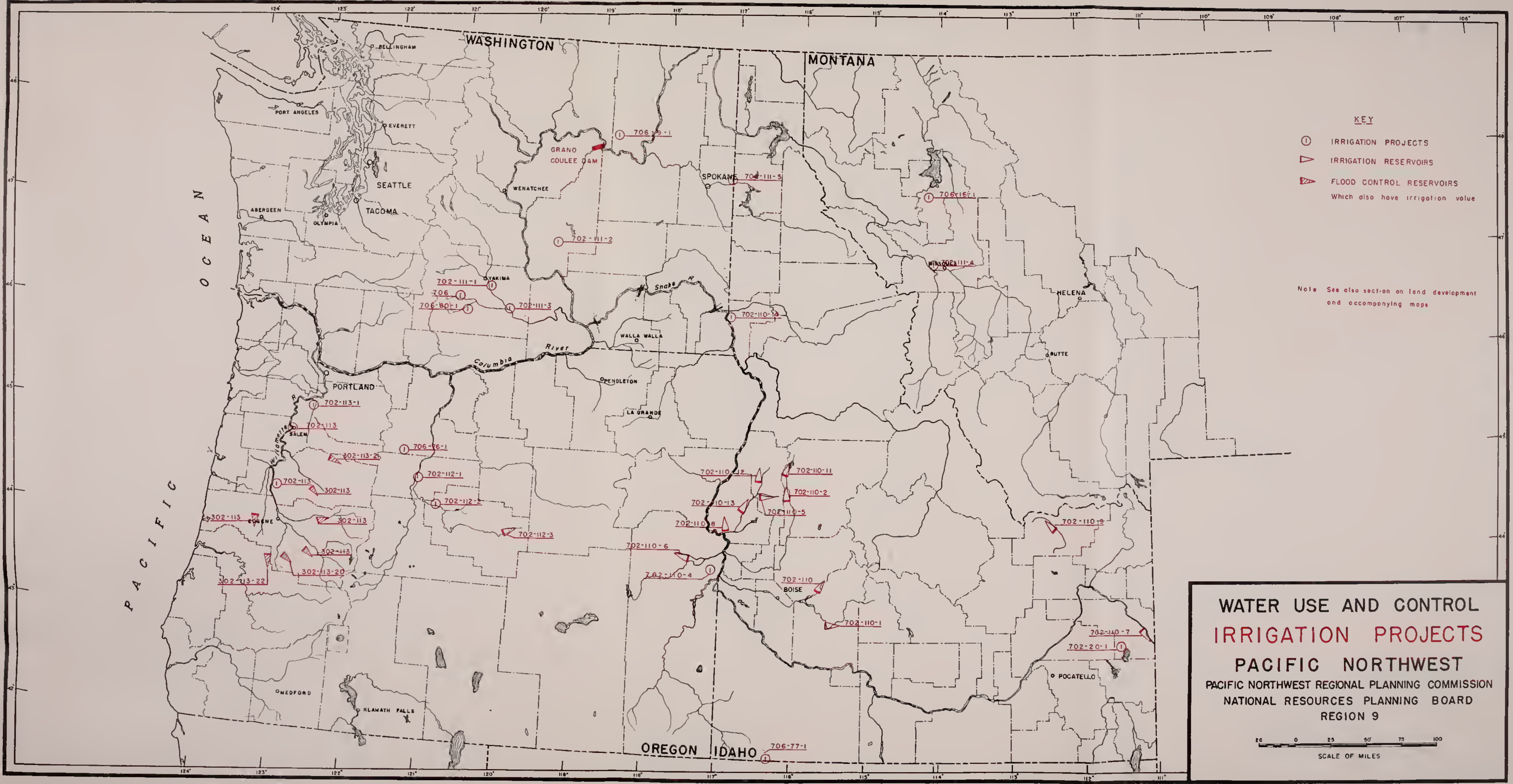
	Devil Creek Reservoir, Oneida County, Idaho		Proposed Wheeler-Case Act projects, in addition to those listed above, submitted by Commissioner of Reclamation, State of Idaho. Estimated costs not available.
	Hornet Creek Reservoir, Adams County, Idaho		
	Montpelier Creek Reservoir, Bear Lake County, Idaho		
	Little Payette Lake Reservoir, Valley County, Iadho		
	Mission Creek Reservoir, Nez Perce County, Idaho		
	Cottonwood Creek Reservoir, Franklin County, Idaho		
	Bennet Creek Reservoir, Elmore County, Idaho		
	West Camas Creek Reservoir, Clark County, Idaho		
	Georgetown Creek Reservoir, Bear Lake County, Idaho		

STATE PROPOSALS, MONTANA, WEST OF CONTINENTAL DIVIDE

	Talley Lake storage, Flathead County, Mont	$342,279	Projects proposed by Montana State Water Conservation Board.
	Finley Point storage, Lake County, Mont	87,787	
	Twin Lakes storage, Lincoln County, Mont	19,000	
	Missoula diversion, Missoula County, Mont	1,300,000	
	Rattlesnake storage, Missoula County, Mont	44,019	
	Tower Lake storage, Missoula County, Mont	12,840	
	East Twin Lake storage, Missoula County, Mont	8,247	
	Three Small Lakes, Missoula County, Mont	3,000	
	Big Flat diversion, Missoula County, Mont	69,700	
	Bear Creek storage, Ravalli County, Mont	114,737	
	Blodgett Creek storage, Ravalli County, Mont	432,727	
	Florence storage, Ravalli County, Mont	121,818	
	County wide, Ravalli County, Mont	11,993	



WATER USE AND CONTROL
IRRIGATION PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9


WATER USE AND CONTROL
IRRIGATION PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
KEY
IRRIGATION PROJECTS
IRRIGATION RESERVOIRS
FLOOD CONTROL RESERVOIRS Which also have irrigation value
Note See also section on land development and accompanying maps
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC OCEAN
BELLINGHAM
PORT ANGELES
EVERETT
SEATTLE
TACOMA
ABERDEEN
OLYMPIA
WENATCHEE
GRAND COULEE DAM
SPOKANE
YAKIMA
WALLA WALLA
PENDLETON
LA GRANDE
PORTLAND
SALEM
EUGENE
MEDFORD
KLAMATH FALLS
BOISE
POCATELLO
MISSOULA
HELENA
BUTTE
Snake R
Columbia River
Willamette
706-19-1
702-111-2
704-111-5
706-16-1
702-111-4
702-111-1
706
706-80-1
702-111-3
702-110-14
702-113-1
702-113
706-76-1
302-113-21
702-112-1
702-113
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702-112-2
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302-113-20
302-113-22
702-112-3
702-110-12
702-110-11
702-110-2
702-110-13
702-110-5
702-110-8
702-110-6
702-110-4
702-110
702-110-3
702-110-1
702-110-7
702-20-1
706-77-1

Figure 58.

There are a number of other localities in this basin where small reservoir projects could be built, or improvements made, advantageously, under the provisions of the Wheeler-Case or Water Facilities acts.

Lower Columbia-Willamette Drainage Basin.—The lower Columbia-Willamette basin includes the Columbia drainage west of the Cascades—primarily a broad intermountain basin extending north and south and including the main and tributary valleys of the Willamette River in Oregon, and the Lewis and Cowlitz rivers in Washington.

In spite of an apparent abundance of annual rainfall, summer rainfall seldom exceeds 3 inches, and often no rain falls for from 30 to 60 days during that season. As a consequence of the dry summer periods, supplemental irrigation is increasingly being used. Areas thus irrigated have shown a decided improvement in diversity, yield, quality, and value of crops.

The Willamette Valley offers the most extensive area west of the Cascades for the development of supplemental irrigation. It has been estimated that 650,000 or more acres of land in the Willamette Valley might ultimately be benefited by such irrigation.[20]

Now under construction by the Corps of Engineers is the Willamette Valley project, the primary purpose of which is to protect the area against floods, with incidental aids in the development of navigation, power, and irrigation, and in the reduction of stream pollution. The project as now programmed will have a total combined storage capacity of 1,345,000 acre-feet. Of the total estimated cost of $62,300,000, approximately $10,380,000 is chargeable to irrigation. This project will provide 566,000 acre-feet of water per year for supplemental summer irrigation of 355,000 acres. While benefits of irrigation to valley agriculture will be large, the current view is that it will not result in a large increase in the number of self-sustaining farm units.

In the vicinity of Canby, Oreg., is an area of 4,300 acres, considered particularly well adapted to supplemental irrigation. The Bureau of Reclamation has recommended a project for this area, which should serve as a demonstration for other public projects in the basin.

Puget Sound and Washington Coast Drainage Basins.—Precipitation in the Coast basins of Washington is generally abundant. In the Puget Sound basin, the conditions with respect to irrigation are quite similar to those in the Willamette Valley—the desirability of summer irrigation is gaining increasing recognition. In the lee of the Olympic Mountains west of the Sound, there are small special areas where the average annual rainfall is only about fifteen inches, where several thousand areas have been under irrigation for a number of years, and where some extensions are considered desirable.

Oregon Coast Drainage Basins.—Oregon Coast drainage basins include those of a series of short streams originating in the Coast Range and those of the Umpqua and Rogue rivers, which rise in the Cascades and cut through the Coast Range. Agricultural development is confined largely to small areas of coastal plain and to intermountain valleys of the Rogue and Umpqua rivers and their tributaries.

Except in the interior valleys of the Rogue and Umpqua rivers, rainfall is generally sufficient for all purposes. At the present time, upwards of about 70,000 acres in these interior valleys are irrigated; potential development under consideration for ultimate construction would provide supplemental irrigation for approximately 88,000 additional acres of agricultural lands in these interior valleys.

Hydroelectric Power

The waterpower resources of the Pacific Northwest region are of great potential importance, not only in broadening regional development but as a factor in national development and security. Large capacity power installations, ultimately totalling about 3 million kilowatts, are contemplated in large river projects already under way. Six times as much more may be added in other projects as needed. Principal existing plants and load centers are connected by a Federal power transmission grid that is constantly being expanded and strengthened. Energy is available on the grid at low and uniform cost. This combination of conditions affords unique opportunity for the establishment of basic industries in which power is an important factor and also for a rational deconcentration and distribution of large and small industry.

Conditions are particularly favorable to the development of the power resources of the Columbia basin. On the Columbia and its tributaries, multiple benefits—particularly for irrigation, navigation, and power—tend to support one another strongly and create unusual opportunity for large-scale, low-cost power development.

Under its comprehensive plan,[21] the Corps of Engineers recommended the ultimate construction of a chain of 10 multipurpose dams along the main stem of the Columbia River to utilize a greater part of the 1,300-foot fall from the Canadian border to tidewater. Revision of the plans in 1937 changed this figure to 11 dams. This comprehensive project, to cost about $800,000,000, would provide an ultimate installed capacity

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[20] See *Willamette Valley Project*, Corps of Engineers, U. S. Army; *Land Development in Oregon*, Oregon State Planning Board; and Part II of this report.

[21] *Columbia River and Minor Tributaries*, U. S. Corps of Engineers, 1933.

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Under its comprehensive plan,[21] the Corps of Engineers recommended the ultimate construction of a chain of 10 multipurpose dams along the main stem of the Columbia River to utilize a greater part of the 1,300-foot fall from the Canadian border to tidewater. Revision of the plans in 1937 changed this figure to 11 dams. This comprehensive project, to cost about $800,000,000, would provide an ultimate installed capacity of about 10 million horsepower and would ultimately lead to development of two or more million acres of irrigable land in the upper and middle Columbia basins. In addition, major benefits to navigation and some benefits in flood control are contemplated.

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[20] See *Willamette Valley Project*, Corps of Engineers, U. S. Army; *Land Development in Oregon*, Oregon State Planning Board; and Part II of this report.

[21] *Columbia River and Minor Tributaries*, U. S. Corps of Engineers, 1933.

Of the proposed dams on the Columbia River, three have been constructed, the Rock Island by private power interests, the Bonneville by the Corps of Engineers, and the Grand Coulee by the Bureau of Reclamation. Work on the Bonneville power plant is proceeding steadily toward full installation of 518,000 kilowatts by 1944. The Grand Coulee plant installations, to total 1,964,000 kilowatts ultimately, are also going forward, with 3 units of 108,000 kilowatts capacity each to be brought in before June 1942 and 3 more by June 1944. The large demands of defense industry indicate the need of enlarging and speeding up the immediate program. A total of 15 units has been recommended for installation as soon as possible.

The Bonneville Power Administration, charged with distributing and marketing the power generated by the Bonneville and Grand Coulee projects, is now engaged in extending its grid system of transmission lines. The enlargement and strengthening of this regional system of lines and substations is also made a matter of extreme urgency by rapidly expanding defense needs. Improvements of privately owned systems for example, the recently completed Utah-Idaho-Montana tie-line should also aid in meeting such needs.

Under present conditions of rapidly growing power needs, both national and regional, it is desirable carefully to review the power features of multiple-purpose water projects in all parts of the region with a view to determining their place and their timing in meeting defense needs, either through the regional net or through local transmission systems. The Willamette, Umatilla, Payette, Boise, and upper Snake dams are examples of projects that should be so considered.

Although no early hydroelectric developments were contemplated under the plans for the Willamette valley project, basic provisions will be made for a total ultimate power capacity of approximately 413,000 kilowatts.

Significant Federal Hydroelectric Power and Transmission Projects

AS SUBMITTED BY THE BUREAU OF RECLAMATION

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
702-110-3	Minidoka Power Project, Idaho	$220,000	Completion of a project now 75 percent finished. Ready and desirable.
702-111-2	Columbia Basin Project (Grand Coulee) (completion of dam and power plant), Washington.	64,775,000	One of most important projects in region. Ultimate capacity 1,984,000 kw. with 18 major units; 2 station units of 10,000 kw. each now in operation; 6 major units of 108,000 kw. each now being manufactured and installed; early need of additional units indicated; remaining units should be progressively installed as load demand justifies. Will produce power for pumping water for irrigation of 1,200,000 acres and for general use.
	AS SUBMITTED BY THE CORPS OF ENGINEERS, U. S. ARMY		
302-112-3	Bonneville Hydroelectric Plant	$13,967,000	Ultimate capacity 518,000 kw. with 10 power units; 5 units installed; remaining 5 units in progress should be completed without delay to meet urgent power demand.
	Umatille Dam	[1] 52,500,000	General design drawings available. Capacity 385,000 kw. for dam, lock and 385,000 kw. power plant.
	Willamette Valley Dams:		General design drawings available for multiple-purpose dams which form a part of the coordinated basin-wide plan of development.
	Detroit Dam	12,845,000	On North Santiam River, 84,000 kw. installed capacity.
	Lookout Point Dam	22,570,000	On Middle Fork, Willamette River, 128,000 kw. installed capacity.
	Quartz Creek Dam	20,025,000	On McKenzie River, 54,400 kw. installed capacity.
	AS SUBMITTED BY THE BONNEVILLE POWER ADMINISTRATION		
711-45-1	Transmission system, Grand Coulee-Covington, Wash., No. 1 line.	1,730,000	Completion of work now under way. Urgently needed to meet power demands.
711-45-2	Transmission system, Bonneville-North Vancouver, Wash., No. 3 line.	1,219,000	Do.
711-45-3	Transmission system, Covington-Seattle, Wash	68,000	Do.
711-45-4	Transmission system, Grand Coulee-Spokane, Wash., No. 1 line.	1,520,000	Urgently needed to meet power demands. (Under construction.)
711-45-5	Transmission system, Bonneville-North Vancouver, Wash., No. 4 line.	800,000	Do.
711-45-6	Transmission system, Bonneville-Grand Coulee, Wash., line No. 2.	3,753,000	Completion of work now under way. Urgently needed to meet power demands.
711-45-7	Substation construction and additions at various points	3,954,000	Do.
711-45-8	Transmission system, St. Johns-Oregon City, Oreg., No. 2 line.	253,000	Do.
711-45-9	Substation construction and additions at various points	848,000	Urgently needed to meet power demands.
711-45-10	Feeder lines, service connections, etc	1,500,000	Completion of work now under way. Urgently needed to meet power demands.
711-45-14	Grand Coulee-Covington, Wash., line No. 2	3,500,000	Urgently needed for future power demands.
711-45-15	Grand Coulee-Spokane, Wash., No. 2 line	1,520,000	Do.
711-45-16	North Vancouver-Covington, Wash., No. 2 line	2,538,000	Do.
711-45	Substations, surveys, feeder lines, service connections, buildings, tools, equipment.	24,646,500	Desirable expansion as the increase of power demand justifies.
711-45	115 kv. transmission lines and substations	18,719,000	Do.
711-45	230 kv. transmission lines and substation	50,000,000	Do.

[1] Complete with navigation and power.

The Willamette River project, by regulation of the flow, will also bring about some improvement in the seasonal output of existing plants in the valley.

In the Puget Sound basin, improvements have been in progress looking toward increases in capacity and firm output of the city of Seattle's plants on the Skagit River. Some expansion of the city of Tacoma's system is also understood to be contemplated. The lines of the Bonneville-Coulee system are also being connected with Puget Sound centers and systems.

The Umatilla dam project on the Columbia has been urged by various regional interests for a number of years, and a project for construction of its navigation features is under consideration. Its ultimate power capacity, in the neighborhood of 400,000 kilowatts, will fit into the regional transmission system at a strategic mid-Columbia location.

The power output of the Snake basin dams, especially the Anderson Ranch and South Fork projects which are recognized as urgent from the irrigation standpoint, should be considered in connection with the extraction and processing of defense materials in the intermountain region of the Pacific Northwest. For example, this additional power would be a very important factor in the development and processing of the phosphates of that area, which are urgently needed in the defense situation and which are permanently needed for the rehabilitation of western soils.

Completion of relatively minor power improvements on the Minidoka project of the Bureau of Reclamation will also fit into any general scheme for meeting power needs.

Pollution Abatement

The pollution of waters in a number of areas of the Pacific Northwest is a growing menace, calling for effective abatement and control measures. Established policy has placed the responsibility for action in such problems on State and local governments, but there is wide recognition of the need for Federal cooperation in the form of financial and technical aids conditioned upon adequate State regulation.

Pollution problems in the Pacific Northwest cover a fairly wide range, involving sewage, industrial wastes, and mining wastes. Areas affected are the more populous metropolitan areas, the irrigated areas, and certain mining and metal refining areas. The range of deleterious effects is also wide, and problems of water storage and supply, health, nuisance, recreation, fish, and wildlife give promise of becoming increasingly critical in a number of areas.

Quite generally, the cities and industrial plants of this region discharge raw sewage into streams. Fortunately, in a number of instances, steam discharge is sufficiently large to provide adequate dilution. There are, however, a number of localities where the streams already are badly polluted and where treatment of sewage or other wastes is imperative.

Significant Pollution Abatement Projects

LOCAL PROJECTS

Name and location	Amount necessary to complete	Status of plans; remarks
Portland, Oreg., Sewage collection and primary treatment plant.	$10,287,000	Studies and investigations now under way. Bond election will probably be held in November 1942.
Salem, Oreg., outfall sewers—primary treatment plant.	458,000	Preliminary plans ready. Bond election carried in May 1941.
Albany, Oreg., sewers and treatment plant.	150,000	Primary treatment only proposed.
Corvallis, Oreg., sewers and treatment plant.	325,000	
Eugene and Springfield, Oreg., sewage treatment plants.	200,000	Eugene plans completed.
Oregon City, Oreg., sewers, treatment plant.	200,000	
Milton-Freewater, Oreg., sewers and treatment plant.	150,000	
Pendleton, Oreg., additions to present sewage treatment plant.	220,000	
The Dalles, Oreg., primary sewage plant	125,000	
Altamount area, east of Klamath Falls, Oreg., sewers and primary treatment plant.	500,000	
Centralia and Chehalis, Wash., sewage treatment plants.	165,000	
Olympia, Wash., sewage treatment plant.	150,000	
Pullman, Wash., sewage treatment plant.	140,000	
Puyallup, Wash., sewage treatment plant.	150,000	Includes industrial wastes.
Renton, Wash., sewage treatment plant.	100,000	
Seattle, Wash., system improvements	----------	
Spokane, Wash., sewage treatment plant.	1,100,000	
Tacoma, Wash., sewage treatment plant.	1,000,000	Includes some industrial waste.
Idaho Falls, Idaho, sewage treatment plant and sewers.	400,000	
Pocatello, Idaho, sewage treatment plant.	150,000	
Twin Falls, Idaho, sewage treatment plant.	200,000	
Nampa, Idaho, sewage treatment plant	200,000	
Caldwell, Idaho, sewage treatment plant.	185,000	
Boise, Idaho, sewage treatment plant	400,000	
Weiser, Idaho, sewage treatment plant	110,000	

East of the Cascades, sewage treatment plants are badly needed for cities and towns on the Boise, Yakima, Spokane, Wenatchee, Walla Walla, and Umatilla Rivers.

West of the Cascade Mountains, pollution problems are more numerous and more acute. While stream discharges are greater, there is more congestion of population and industry along the shores of rivers and harbors.

In some areas in the Puget Sound basin, pollution by sewage and industrial wastes has reached the point of danger to public health, fish life and oyster beds, and recreational areas. Among the problem areas are Seattle, Tacoma, Bellingham, and Olympia. Other present or potential trouble spots include Grays Harbor, the Chehalis River (Chehalis-Centralia), various lower Columbia River sloughs, and the Willamette, Umpqua, and Rogue Rivers.

The major problem area is the Willamette Valley in Oregon.[22] The Willamette is polluted to a greater or less extent between the head of the valley and the confluence with the Columbia, 200 river-miles downstream. Communities, canneries, pulp mills, and other industrial plants contribute to the pollution, which is especially acute below Oregon City and Portland and especially inimicable to health, fish life, and recreation during summer low-water periods.

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[22] See *Willamette Valley Project*, Oregon State Planning Board, 1936; Reports on Collection and Disposal of Sewage, City of Portland; Reports of Oregon State Sanitary Engineer.

The Willamette Valley project will have some beneficial effects in increasing dilution during periods of low flow, but these should be looked upon as no more than palliative. To safeguard health, to conserve valuable fish runs, and to restore and protect recreational resources, a comprehensive plan and program of waste disposal must be evolved. This would involve execution of the large Portland sewage disposal project and similar works for all the larger communities of the valley, under a program integrally planned, organized, and financed. It would also involve intensive effort in technical research and in actual steps by industry and public to utilize various industrial wastes and check stream pollution.

The city of Portland is proceeding with work on plans for a sewage intercepting system and treatment plant to cost in the neighborhood of $10,000,000 and may refer the project to its voters for approval of the necessary bond issue in 1942.

The city of Salem is laying plans for the construction of a sewage treatment plant at an estimated total cost of $458,000, of which the State of Oregon will contribute not to exceed $75,000 to cover service to the State institutions.[23] The issuance of sewer bonds was carried by the electors of Salem in May 1941.

Other Willamette valley disposal projects are in various stages of inception and development.

Several smaller sewage disposal projects are planned and reasonably ready for development in various communities of the region. Generally, however, further preliminary work, on surveys, plans, appropriations, State and basinwide programs, etc., is needed.

Some of the larger needed and potential projects are included in the list that follows. Other smaller projects, in various stages of readiness, are in prospect for the following cities, among others: Oregon—Cottage Grove, Dallas, Hermiston, Hillsboro. Lebanon, Medford, McMinnville, Newberg, Springfield, West Linn. Coquille, Hood River, Ontario, Tillamook, Oceanlake; Washington—Auburn, Burlington, Cashmere, Cle Elum, Colville, Enumclaw, Grandview. Kent. Kirkland, Monroe, Mt. Vernon, Omak, Palouse. Pomeroy, Roslyn, Sedro Woolley. Shelton, Snohomish, Sumner, Sunnyside, Tekoa, Toppenish; Idaho—Blackfoot, Burley, Payette. Many of these smaller projects are related to potential comprehensive plans for pollution abatement in various streams (the Willamette, Yakima, Spokane, Palouse, Snake, for example) and should not be considered as isolated projects.

Investigations should be carried forward to develop and put into effect feasible methods and controls for reclaming or otherwise safely and economically disposing of industrial wastes, and for settling the solid wastes of mining operations, in scattered areas of the Pacific Northwest (including the Grays Harbor, Willamette, Clark Fork. Spokane, John Day. and Rogue drainages).

Land Development

Land, regardless of ownership, is a fundamental national resource; its improvement, upkeep, and wise use are matters of common concern. The development and conservation of land resources provides one of the largest and most fundamental fields for public work, and private and cooperative works and services as well. These works and services, involving broadly land reclamation and use and the conservation of soil, water, and cover, fall into several categories.

Land reclamation through the various means—irrigation, drainage, diking and clearing—has been given special treatment in part II of this report. Projects relating to land development and conservation through water use and control have been discussed earlier in this section, while those relating to forest and park management are covered under subsequent headings.

Because of the close relationships involved, it is especially important that any plan for works and services in relation to land be based on thorough over-all analyses, area by area, of conditions, problems, and needed adjustments and improvements. Only through such analyses can the diverse, scattered, and usually small land projects be pulled into an integrated program, so that something like the full potential values may be realized.

In the West, a considerable proportion of land improvements will relate to public lands. Approximately one-half of the total acreage of the four States of the Pacific Northwest is publicly owned. The management of the vast area of publicly owned lands is divided among more than a score of Federal agencies, various departments of the four States, and a large number of counties, minor districts, and municipalities. Of the Federal agencies involved, 11 have jurisdiction over more than 100.000 acres each; the Forest Service administering the largest area of about 60 million acres. Other large Federal holdings are in the unappropriated public domain, the Oregon and California revested lands, the Indian reservations, and the national parks, all under the Interior Department. Large State hold-

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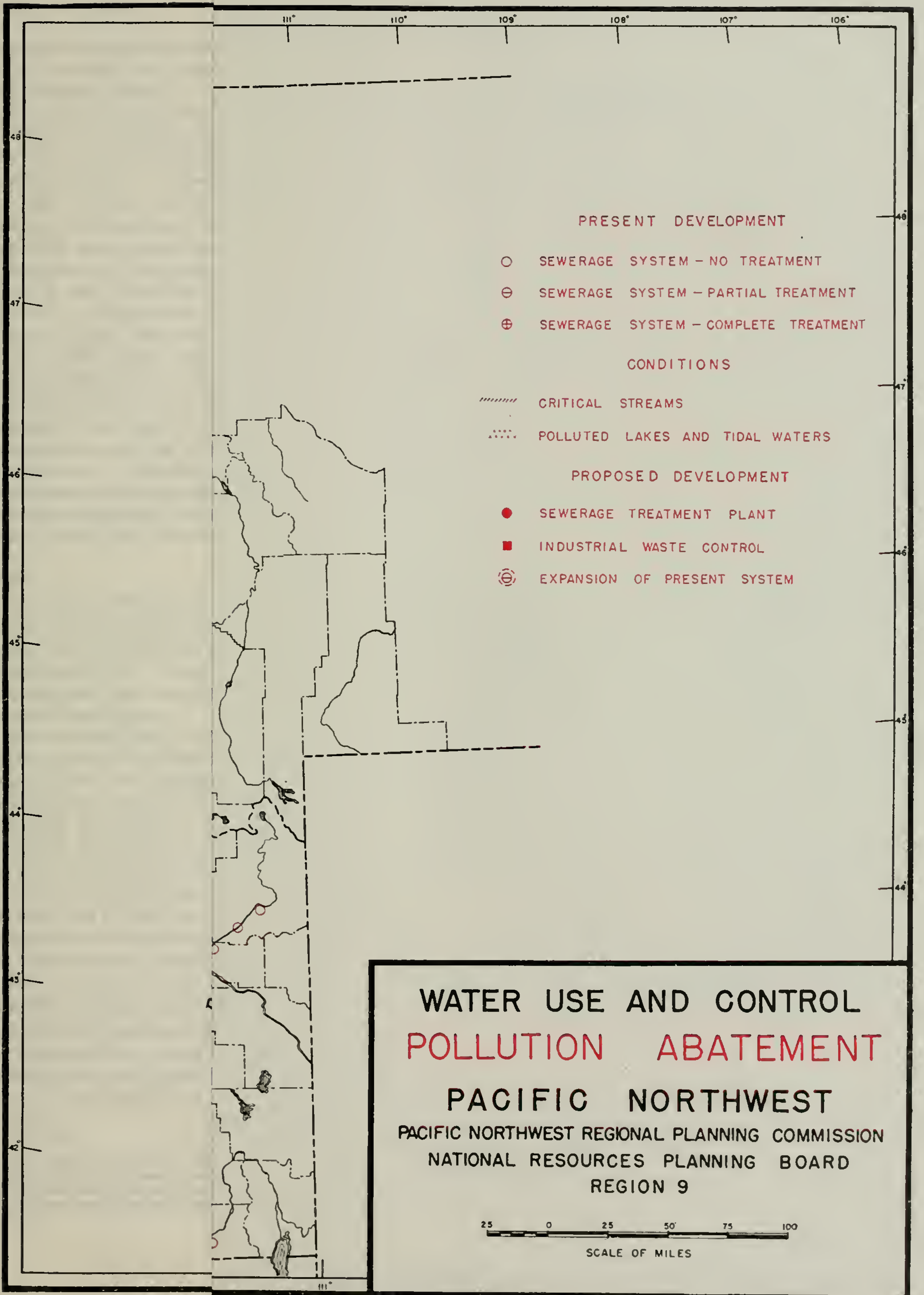
[23] *Six-Year Construction Program*, State of Oregon, 1940.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PRESENT DEVELOPMENT
○ SEWERAGE SYSTEM – NO TREATMENT
⊖ SEWERAGE SYSTEM – PARTIAL TREATMENT
⊕ SEWERAGE SYSTEM – COMPLETE TREATMENT
CONDITIONS
CRITICAL STREAMS
POLLUTED LAKES AND TIDAL WATERS
PROPOSED DEVELOPMENT
● SEWERAGE TREATMENT PLANT
■ INDUSTRIAL WASTE CONTROL
EXPANSION OF PRESENT SYSTEM
25 0 25 50 75 100
SCALE OF MILES

WATER USE AND CONTROL
POLLUTION ABATEMENT
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

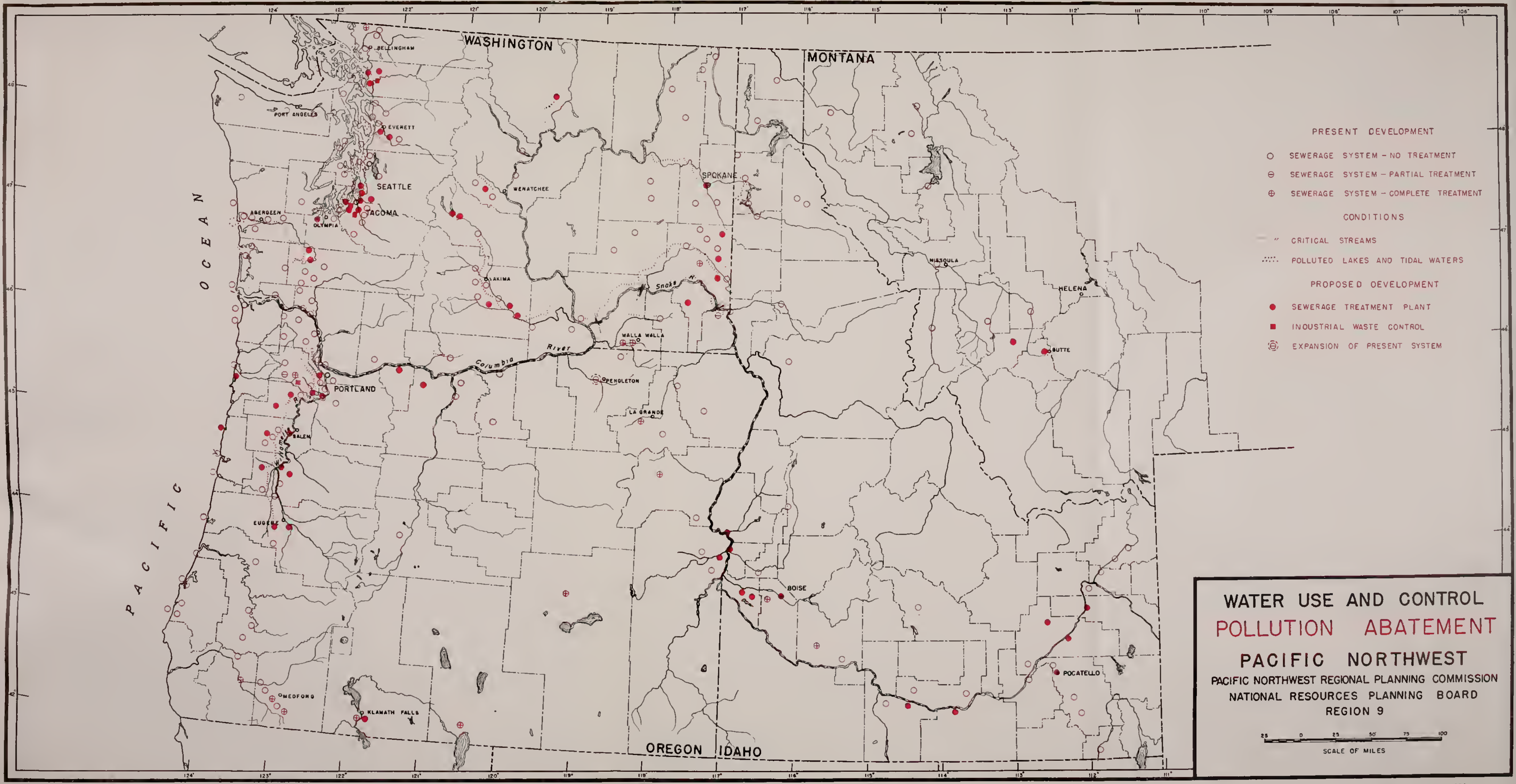
WATER USE AND CONTROL
POLLUTION ABATEMENT
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
25 0 25 50 75 100
PRESENT DEVELOPMENT
○ SEWERAGE SYSTEM – NO TREATMENT
⊖ SEWERAGE SYSTEM – PARTIAL TREATMENT
⊕ SEWERAGE SYSTEM – COMPLETE TREATMENT
CONDITIONS
CRITICAL STREAMS
POLLUTED LAKES AND TIDAL WATERS
PROPOSED DEVELOPMENT
● SEWERAGE TREATMENT PLANT
■ INDUSTRIAL WASTE CONTROL
EXPANSION OF PRESENT SYSTEM
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC OCEAN
BELLINGHAM
PORT ANGELES
EVERETT
SEATTLE
TACOMA
OLYMPIA
ABERDEEN
WENATCHEE
SPOKANE
YAKIMA
Snake R.
Columbia River
WALLA WALLA
PENDLETON
LA GRANDE
PORTLAND
SALEM
Willamette R.
EUGENE
MEDFORD
KLAMATH FALLS
BOISE
POCATELLO
MISSOULA
HELENA
BUTTE
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FIGURE 59.

ings are in State forests, school lands, and parks. Large county holdings have come about through reversion of tax delinquent lands.

The development of these great areas of public lands involves many public works projects, having to do with the control and use of forests, range, wildlife, and recreation resources. Projects looking toward the scientific and economic management of public lands of all kinds, in the interest of sustained productivity, are of decidedly great importance to the regional economy. Forest-resource maintenance is of paramount importance in the Pacific Northwest, where, as has been pointed out, the economic dependence on forest production is so high. The reclamation of agricultural lands in the public domain has much to do with the future progress of the region. The grazing lands of the region, which must also be conserved, provide a considerable segment of the region's economic base. Recreational areas, such as national and State parks, provide useful work and are a priceless asset to region and Nation. The preservation and development of fish and wildlife resources are matters of considerable importance to the region from both economic and cultural standpoints.

Parks

The Pacific Northwest has unexcelled natural recreational resources, for summer and winter use, from ocean beaches, bays, and streams, to mountain lakes, forests, and peaks. These are widely recognized as of both regional and national, and both economic and cultural, importance.

The national parks and monuments comprise the greater part of the 2 million acres in the region's park areas. Under the multiple-use management plan, additional large areas in the national forests are devoted primarily or largely to recreational use. The four States of the Pacific Northwest maintain nearly 200 park units, with a total area of about 80,000 acres. In addition, there are various county and municipal parks, the total area of which is not available. These various systems are, in many respects at least, far from adequate for all present and prospective needs.[24]

There are many areas of scenic, recreational, and scientific value that might well be added to the present regional public system of public parks and monuments for the benefit of future generations. Many of the existing park areas should be further improved to meet the growing public need of and interest in outdoor recreation.

There is also need for a better coordination in planning, development, and management of recreational areas by responsible Federal, State and local agencies.

Among areas in which cooperative development programs of considerable importance might well be undertaken in the near future are the reservoir and Coulee areas of the Columbia Basin project in Washington and the interstate Columbia Gorge area in Washington and Oregon.[25]

National park areas subject to further development include particularly the larger parks: Crater Lake, Rainier, Olympic, and Glacier. There are also significant potential programs in national monuments and recreational demonstration areas. Numerous recreational areas in the national forests are susceptible of added development, among them areas of such outstanding attraction as Mount Hood, Oreg., Mount Baker, Wash., the Sawtooth Mountains of Idaho, and various mountain lake areas in all of the States. The park chains of all of the States are subject both to expansion and to more intensive development. The development of urban and metropolitan parks, parkways, and green-belt areas in the region is as yet embryonic.

The kinds of works, available and potential, in park and other large recreational areas are diverse. They encompass improved facilities: for access, transportation, and travel, particularly roads and trails; for shelter, camping, and picnicking; for winter sports, including ski courses, shelter, and sanitary facilities; for boating and fishing; for play areas; for communications; for use, protection, and administration, including various utilities.

Outside of the park areas proper, important work programs should be developed for the conservation of scenery, particularly roadside timber, on outstanding recreational tour routes.

The individual projects are numerous and generally small; their regional significance results largely from their cumulative effects in development and conservation of scenic and recreational resources of the region and its local areas. A few of the more significant or typical projects now available are listed. Projects for only one of the national parks—the newly created Olympic National Park—are included; available projects in other parks are rather similar. Likewise, available projects for one of the national forest recreational areas—Mount Baker—are included.

Forests

The status of the Pacific Northwest's forests as a principal source of supply for the Nation and the high

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[24] See National Park Service Year Books; cooperative State studies: *Oregon's Parks, Recreational Areas and Facilities, Idaho Park, Parkway and Recreational Areas, Washington Parks, Parkways and Recreational Areas;* also *Cascade Mountains Study,* Washington State Planning Council.

[25] See reports on joint investigations, Columbia Basin project, Bureau of Reclamation et al.; report of Pacific Northwest Regional Planning Commission on Columbia Gorge Conservation and Development.

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The status of the Pacific Northwest's forests as a principal source of supply for the Nation and the high

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[25] See reports on joint investigations, Columbia Basin project, Bureau of Reclamation et al.; report of Pacific Northwest Regional Planning Commission on Columbia Gorge Conservation and Development.

Significant or Typical Park and Recreational Projects

FEDERAL PROJECTS, AS SUBMITTED BY THE NATIONAL PARK SERVICE

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
707- 21- 1	Development of Port Angeles headquarters area, Olympic National Park, Wash.	$175,800	Plans not begun. Essential part of management system of park.
707- 21- 2	Corrals throughout the park, Olympic National Park, Wash.	3,300	Do.
707- 21- 3	Lake Quinault area, Olympic National Park, Wash	30,100	Do.
707- 21- 4	Communication systems, Olympic National Park, Wash	700	Do.
707- 21- 5	Trailside shelters, Olympic National Park, Wash	64,200	Plans completed. Essential for protection against inclement weather.
707- 21- 6	Patrol cabins, Olympic National Park, Wash	65,500	Plans not begun. Essential part of management system of park.
707- 21- 7	Development of outlying areas, Olympic National Park, Wash.	53,100	Do.
707- 21- 8	Comfort stations throughout park, Olympic National Park, Wash.	20,240	Do.
707- 21- 9	Graves Creek area, Olympic National Park, Wash	6,600	Do.
707- 21-10	Lake Crescent, Olympic National Park, Wash	13,300	Do.
707- 21-11	Road development, Olympic National Park, Wash	673,100	Plans not begun. Essential for proper access to park.
707- 21-12	Trail development, Olympic National Park, Wash	254,400	Do.
707-207- 1	Administration area and miscellaneous work, Silver Creek recreational demonstration area, Marion County, Oreg.	47,085	Partially completed. Essential part of management system of demonstration area.
707-207- 2	Day use area, Silver Creek recreational demonstration area, Marion County, Oreg.	22,245	Not started. Essential for convenience and comfort of day visitors.
707-207- 3	Organized camp No. 3, Silver Creek recreational demonstration area, Marion County, Oreg.	10,760	Partially completed. Essential for convenience of visitors.
707-207- 4	Organized camp No. 4B, Silver Creek recreational demonstration area, Marion County, Oreg.	138,390	Not started. Essential for convenience of visitors.
707-207- 5	Organized camp No. 5O, Silver Creek recreational demonstration area, Marion County, Oreg.	93,560	Do.

FEDERAL PROJECTS, AS SUBMITTED BY THE NATIONAL FOREST SERVICE

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
805-114- 1	Alpine ski shelter, Mount Baker National Forest, Wash	$8,960	Preliminary plans completed. Important unit in recreational plans for forests.
805-114- 2	Mount Baker Lodge, Mount Baker National Forest, Wash.	300,000	Preliminary plans completed. A major unit in recreational plans for forests.
805-114- 3	Austin Pass ski shelter, Mount Baker National Forest, Wash.	20,000	Preliminary plans completed. Important unit in recreational plans for forests.
805-114- 4, 5, 6	Ski shelters, Mount Baker National Forest, Wash	26,950	Do.

STATE PROJECTS, STATE OF IDAHO

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
-----------	Lava Hot Springs	$187,000	The proposed 6-year program consists of sewer system, water system, powerhouse and lighting system, reconstruction of pools and mud baths, buildings.

STATE PROJECTS, STATE OF OREGON

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
-----------	Tentative 6-year program	$630,000	The State park system of Oregon consists of 105 units with a total area of 22,060 acres distributed in 30 counties. A tentative 6-year program involving expenditure of $105,000 per year for buildings and improvements. Details are not available.

rate of regional economic dependency upon forest resources already discussed[26] emphasize the importance of research and works programs having to do with the management of the forests in the interest of sustained yield. Under the established multiple-use principle of forest management, forest yield must be sustained not only in timber production, but as to watershed and soil protection, livestock range, wildlife habitat, and recreational use.

The forests are of greater importance to economic life in the Pacific Northwest than in any other large area in continental United States. As previously stated, they cover nearly 40 percent of the four States, in widely distributed areas, and include over one-half of the remaining timber stand in the United States.

Under these conditions, the improvements necessary to the wise management and use of forests assume a vital importance in the regional scheme. In both national and State forests, a wide range of projects relating to administrative facilities; to protection against fire, insects, and disease; reforestation; communications, roads, and trails; watershed protection; water conservation; recreational facilities; research, experimental, and demonstration programs must be carried forward.

Since 42 percent of the timber in the Pacific Northwest is privately owned, and since private investment in timber and timber industries and services in the region exceeds a billion dollars, private programs and works in this field are also likely to have considerable bearing on the region's future. The adequate protection of these forests is a cooperative service of large magnitude. The restocking of cut-over and burned-over areas on private forest lands is a work of great economic and social importance and there are strong evidences of increasing recognition in the industry of the desirability of finding ways and means of carrying out rehabilitation programs in this field.

In areas where timber depletion has reached an advanced stage, the development of programs looking

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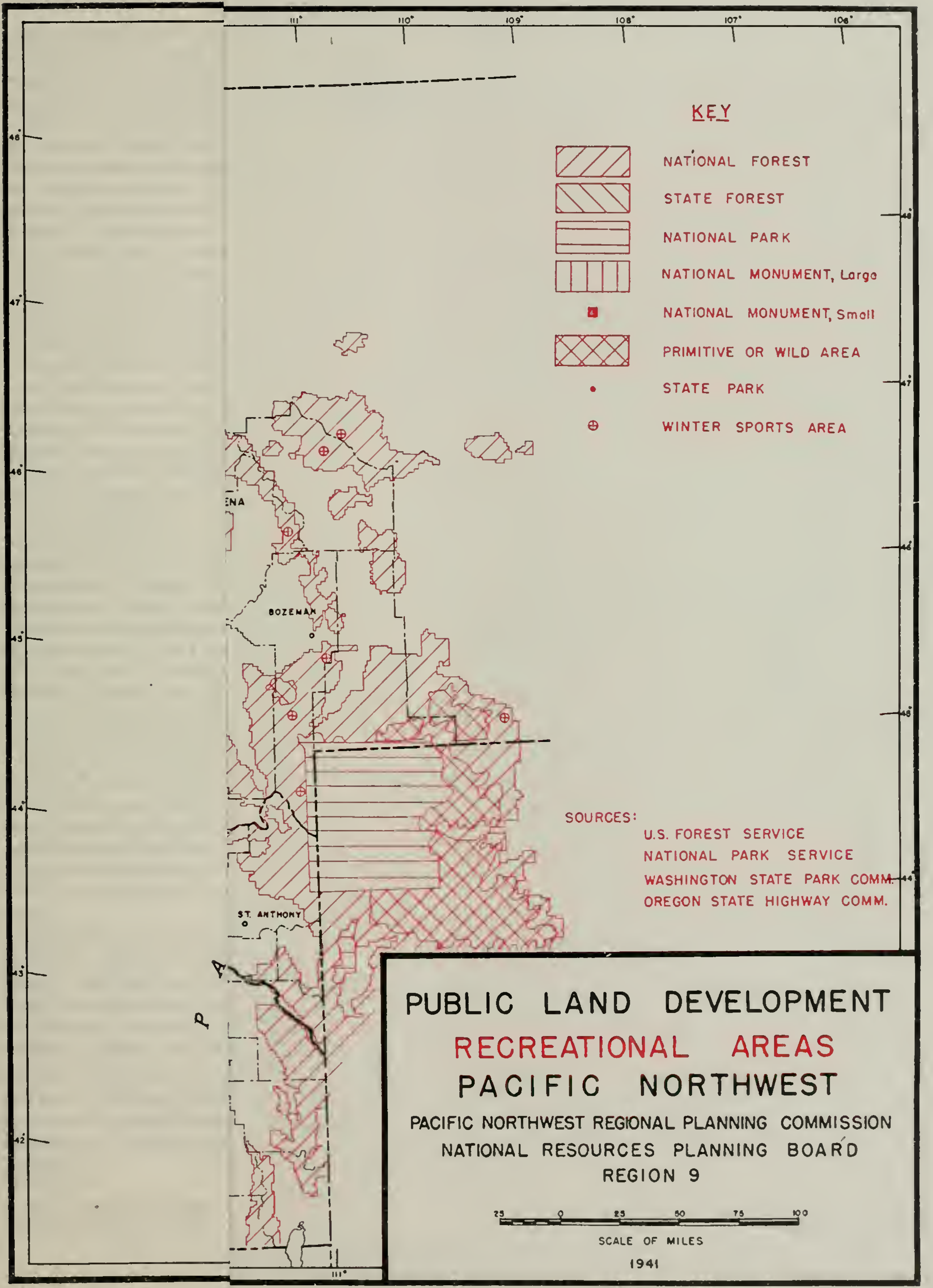
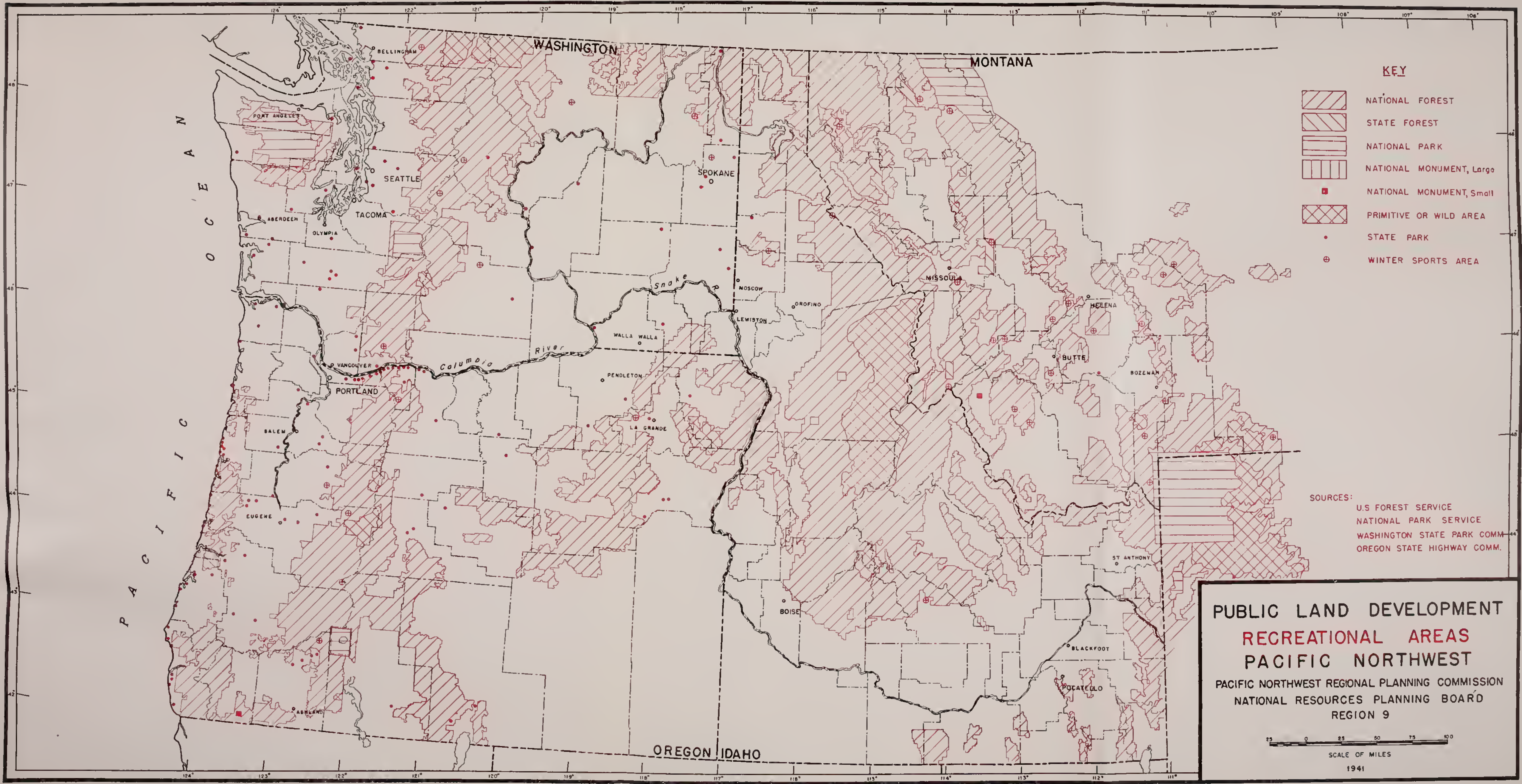
[26] See *Pacific Northwest Forest Resources*, 1938, and *Migration and the Development of Economy Opportunity in the Pacific Northwest*, 1939, Pacific Northwest Regional Planning Commission.



SOURCES:
U.S. FOREST SERVICE
NATIONAL PARK SERVICE
WASHINGTON STATE PARK COMM.
OREGON STATE HIGHWAY COMM.

PUBLIC LAND DEVELOPMENT
RECREATIONAL AREAS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941


PUBLIC LAND DEVELOPMENT
RECREATIONAL AREAS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
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75
100
1941
KEY
▨ NATIONAL FOREST
▨ STATE FOREST
▤ NATIONAL PARK
▥ NATIONAL MONUMENT, Large
■ NATIONAL MONUMENT, Small
▩ PRIMITIVE OR WILD AREA
• STATE PARK
⊕ WINTER SPORTS AREA
SOURCES:
U.S FOREST SERVICE
NATIONAL PARK SERVICE
WASHINGTON STATE PARK COMM.
OREGON STATE HIGHWAY COMM.
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC OCEAN
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SPOKANE
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Figure 60.

toward salvage and rehabilitation, conservation, waste elimination, and better utilization with respect to remaining resources, and to new land and industrial uses and activities is especially important.[27]

With a view to effective use of cut-over forest lands and to future forest income more extended and larger-scale experimentation in growing tracts of various timber species in a series of localities covering a range of growing conditions has been suggested as a desirable project for development.

For forest areas in which the ratio of forest drain to forest growth has not yet reached a critical stage, emphasis must be upon programs and works that will aid in protection, waste elimination, and the establishment of organization and facilities for sustained yield operation within rational working circles.

In most forested areas—particularly on the farm-forest fringe—forest and woodland conservation work programs will have an important bearing on rural employment and stability in the farm and community economies affected. Maintenance of farm woodlands is of definite importance from the standpoint of farm income and stabilization. Industrial research in new uses for forest products and materials now wasted must be expanded and pushed through the stage of commercial development, if greater stability is to be attained in communities largely dependent on the forest resource. This means not only expanded research activities of the type carried on by the Forest Products Laboratory, but pilot plant and commercial development work. To achieve the desired ends, it may be necessary to provide means of financing forest cooperative ventures in the processing and manufacturing fields.

Present forest public works programs are primarily those of Federal agencies, such as the Forest Service, Indian Service, and the Oregon and California Revested Land Administration, and of conservation and forestry departments of the States. There are worth-while fields for the development of conservation programs at lower levels—for community, county, and roadside forest areas.

Available projects and programs are numerous and extensive. Although individual works—for administrative, operating, and other facilities—are generally small, the total effect is significant. The larger effects of works and services in the forest field are those of adequate systems of area management of forest resources—timber, range, watershed, wildlife, recreation, and so on. Because of their character, individual projects are not listed, except for representative forest recreational facilities included under the preceding heading.

Wildlife (Including Fish)

The large and varied wildlife resources of the Pacific Northwest are of such economic and social value as to merit serious consideration in any comprehensive program for regional conservation and improvement. Taken as a whole, these resources are the basis for a regional income of probably $75,000,000 annually. The region affords habitat for a considerable variety of big game animals, small fur-bearing animals, upland birds, waterfowl, commercial and game fish, and other marine life. Pacific Northwest fisheries (in contrast to those of other regions formerly rich in fish life) are still outstanding as economic assets. The need for developing the wildlife resources as fully as possible becomes evident when it is realized that even with current heavy protection, many areas are overhunted and overfished today. In the future, not only will the population of the Pacific Northwest be greater, but the portion of the public that derives recreational enjoyment from fishing, hunting, and wildlife photography is increasing. In addition, improvements in transportation facilities are making wildlife so readily available that the problem of maintaining adequate supply will be multiplied many times over.

It is well known that the region can support several times its present number of most fish and wildlife species without interfering with other land and water uses. Progress to these ends is, however, dependent in considerable part upon intelligent management, efficient protection, and adequate propagation, as well as upon land and stream improvements—namely, upon direct measures for improvement of habitat: such as nesting, feeding, and resting sanctuaries for waterfowl; creation of winter and nesting cover, and water developments for upland game; preservation of adequate winter range for big game; removal of unnecessary and uneconomic barriers to the ascent of fish in rivers and streams, providing fish ladders were feasible; protection and improvement to spawning grounds; screening irrigation and power diversions; supplementing natural reproduction by artificial propagation where natural spawning areas are curtailed by higher use, or where otherwise economically sound; and pollution abatement. All of these measures should be applied with respect to both public and private lands and waters. It is also dependent in a very large degree upon constant biological research and investigation, coupled with wildlife and fisheries planning that is closely integrated with that in other land and water conservation and development fields. The objective should be not only to mitigate damage to fish and wildlife, insofar as possible, but to take advantage, where it is possible, of land and water developments that may, through coordinated action, be turned to the distinct benefit of fish and wildlife.

The conservation and development of wildlife re-

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[27] See the *Elma Survey, Grays Harbor County, Washington,* Washington State Planning Council, 1941.

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The conservation and development of wildlife resources are very closely bound with land and water programs—public and private. Very importantly, the maintenance of the wildlife resources is dependent upon precautionary measures taken in connection with the design and construction of various land and water development projects—in the provision for cover for game and birds in connection with land development and soil conservation projects, for control of water surfaces in the interest of important waterfowl feeding areas, for fish ladders and screens at dams and intake structures, and for compensatory measures in propagation where balance has been interfered with, for example.

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[27] See the *Elma Survey, Grays Harbor County, Washington*, Washington State Planning Council, 1941.

Presently available projects in this field have been planned with the customary large-sized public work labor units in mind and include, principally, such projects as the intensive development of Federal game refuges and creation of facilities for propagation and distribution of fish by the Fish and Wildlife Service and the several State fish and game departments. Wildlife presents a special problem in land and stream development because it occurs universally on all kinds of land—forest, range, and agricultural—but only occasionally in large numbers on small unit areas. Concentrations of wildlife do not ordinarily justify establishment of large-sized emergency labor units, such as CCC camps. Unless the labor units used are flexible in size, from 200-man camps down to smaller units with as low as five men, or unless wildlife developments may be made an integral part of every work unit (whether for road, forest and range, soil, reclamation, or hydroelectric developments), the benefits to wildlife from small but universally distributed wildlife projects will be largely lost.

Another outstanding wildlife problem is the artificial maintenance of reasonable hunting and fishing possibilities in the vicinity of centers of populations. Sport fishing, for example, has declined almost universally in areas of concentrated population. Both States and Federal governments have large restocking programs, but these are becoming inadequate to meet the growing fishing demands. Pressure by the fishing public has already become so great that ordinary or traditional measures fail to meet the needs. There are limits above which desirable conditions cannot be maintained in such areas by reason of financial costs. Nevertheless, the possibilities have not been exhausted, and any comprehensive plan for improvement of wildlife should provide for efforts in this direction. Bolder plans and more extraordinary measures are required in the future.

Included in current project lists are a number of Federal and State fish cultural stations, rearing ponds, hatchery and service buildings; fish screens and ladders at irrigation works; water control, truck trail, fencing, and service improvements and structures at game refuges. Some of the more significant or typical projects are included in the accompanying brief list.

Significant and Typical Wildlife Projects

FEDERAL PROJECTS, AS SUBMITTED BY THE FISH AND WILDLIFE SERVICE

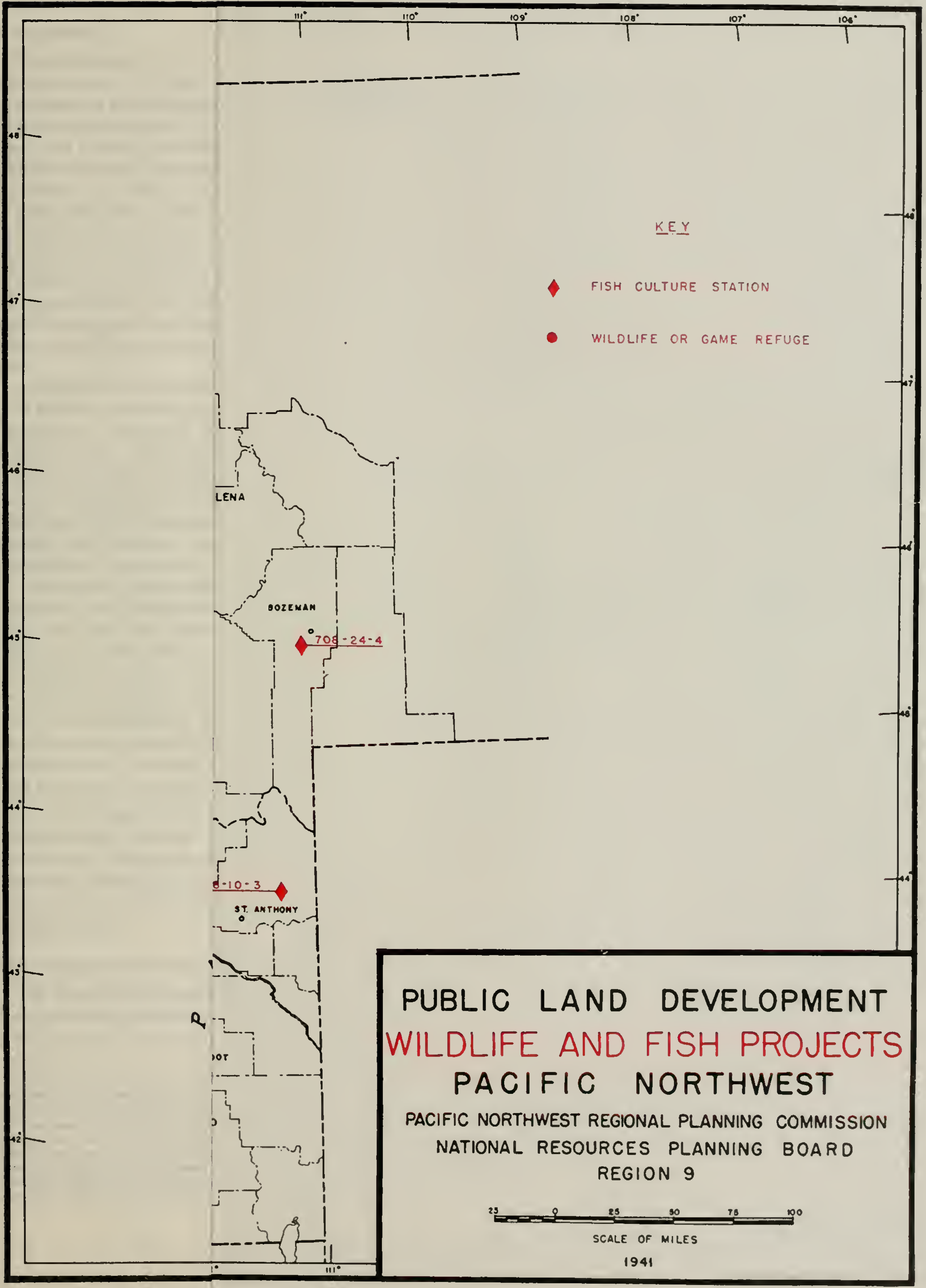
Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
708-10-1	Fish cultural station, Clearwater River, Idaho	$75,000	No plans. Important unit for the preservation of fish resources.
708-10-2	Fish cultural station, upper Salmon River, Idaho	50,000	Do.
	Completion of fish cultural unit, Big White Salmon Station, Wash., including rearing ponds.	50,000	Do.
	Completion of fish cultural unit, Wind River, Wash., including rearing ponds, dams, and water supply lines.	50,000	Do.
	Fish cultural station, State of Oregon, location to be determined	150,000	Do.
	Fish cultural units in National Parks and Forests, locations to be determined—5 each for Washington, Oregon, Idaho, and Montana—20 at $50,000.	1,000,000	Do.
708-10-3	Completion of fish cultural unit, Warm River, Idaho, including rearing ponds, hydroelectric plant with refrigeration equipment.	42,750	Do.
708-10-4	Construction of reinforced concrete pool, Black Canyon Dam fishways, near Emmett, Idaho.	250,000	Do.
708-10-5	Construction of additional fish propagating ponds and appurtenances at Fisheries Station, Hagerman, Idaho.	100,000	Do.
708-35-1	Water control development, Malheur National Wildlife Refuge, Harney County, Oreg.	300,000	No plans. Important unit for preservation of wildlife resources.
708-45-1	Fencing, Little Pend Orielle National Wildlife Refuge, Stevens County, Wash.	20,000	Do.
708-45-2	Water control development, Little Pend Oreille National Wildlife Refuge, Stevens County, Wash.	50,000	Plans completed. Important unit for preservation of wildlife resources.
708-45-3	Truck trails, Little Pend Oreille National Wildlife Refuge, Stevens County, Wash.	25,000	Do.
708-45-4	Fish screens and ladders in irrigation works, Washington, Oregon, Idaho, Montana	442,500	Continuation of work underway. Important program for preservation of fish resources.
	Hatcheries for commercial and game fish, Grand Coulee project	($893,000)	Completion of work underway.

STATE PROJECTS, IDAHO—FISH AND GAME COMMISSION

	Irrigation ditch screens, hatchery improvements, rearing ponds, game farm improvements, land development.	$262,000	

STATE PROJECTS, MONTANA—FISH AND GAME COMMISSION

	Irrigation ditch screens, rearing ponds, addition to hatcheries, foreman's residence at hatchery, miscellaneous additions and betterments.	$94,000	



PUBLIC LAND DEVELOPMENT
WILDLIFE AND FISH PROJECTS
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

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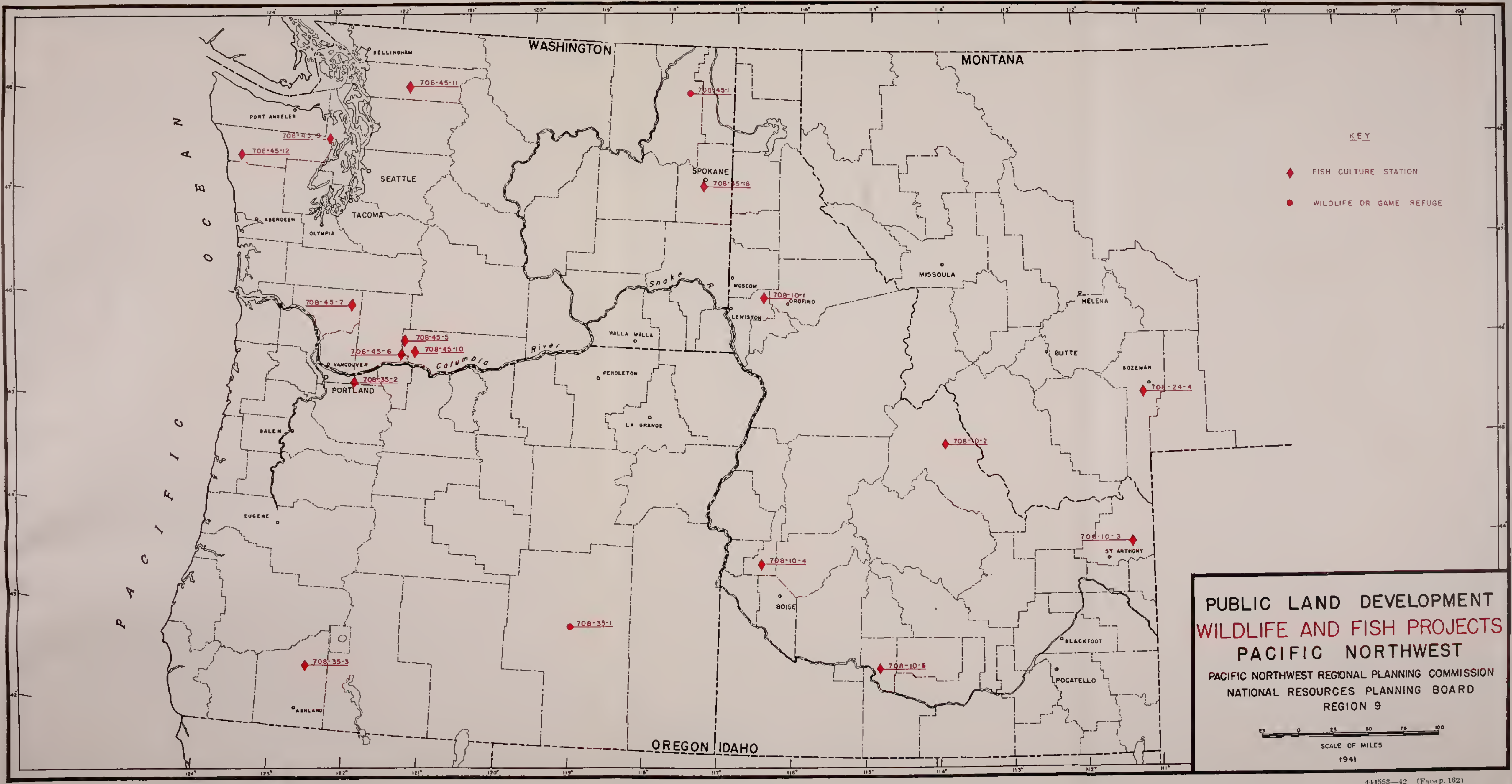
PUBLIC LAND DEVELOPMENT
WILDLIFE AND FISH PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
1941
KEY
♦ FISH CULTURE STATION
● WILDLIFE OR GAME REFUGE
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC OCEAN
BELLINGHAM
PORT ANGELES
SEATTLE
TACOMA
ABERDEEN
OLYMPIA
SPOKANE
MOSCOW
LEWISTON
OROFINO
WALLA WALLA
PENDLETON
LA GRANDE
VANCOUVER
PORTLAND
SALEM
EUGENE
ASHLAND
MISSOULA
HELENA
BUTTE
BOZEMAN
ST ANTHONY
BOISE
BLACKFOOT
POCATELLO
Snake R.
Columbia River
708-45-11
708-45-1
708-45-9
708-45-12
708-45-18
708-45-7
708-45-5
708-45-6
708-45-10
708-35-2
708-10-1
708-24-4
708-10-2
708-10-3
708-10-4
708-35-1
708-35-3
708-10-5

Figure 61.

Transportation

Transportation offers one of the larger and more promising fields for the development and internal improvement of the region and for fruitful activity in the post-emergency period. Improved facilities and equipment and a better coordination of means of transportation should bring about many economies and many improvements in service and convenience.

Potential works include: improvements and additions to transportation lines—waterway, railway, highway, and airway; modernization of line equipment; and improvements to individual and joint terminal facilities and equipment. Many of these improvements should look toward improved interchange between various lines and toward the more rational use of each kind of transport.

At the end of the intensive defense effort, it is likely that the time will be ripe for many transportation improvements. Generally, it may be anticipated: that no wide expansion will occur in railroad construction,[28] but that extensive reorganizations will be in order; that extensive modernization of trunk highways and city highways will be programmed; that due largely to expanded basic industry, continued inland navigation improvement, in waterways, equipment and terminals, will be a profitable undertaking; that a sharp turn toward expansion and improvement of commercial air equipment and lines will take place on the slackening of military aviation needs. The regional availability of new metal industries, including the significant light metal plants—and the large new capacity for aircraft, ship, and boat building may well be important factors in the modernization of transportation equipment of various kinds. The wide availability of low-cost power may have important effects on some forms of transportation and transportation industry. Planning of joint transportation, transit, and terminal reconstruction projects for cities and metropolitan areas should be especially fruitful. A program of pipe-line construction may be a transportation development of the more distant future.

Water Transportation; Rivers and Harbors[29]

The Pacific Northwest's rivers and harbors—particularly the Columbia River and Puget Sound—have been a major factor in the development of the region up to the present. With the new trend in establishment of basic industries in the region, new influences should be felt. The region's harbors and its major streams undoubtedly should exercise strong influences upon the distribution of new industries, and, reciprocally, the establishment of a number of heavy industries should have material effects upon the traffic and general development of waterways and ports. Among inland waterways that should play a particularly important part in this interplay of economic forces are the middle and lower Columbia, the lower Snake, the middle and lower Willamette, Grays Harbor, and Puget Sound.

The Columbia River has been recognized as navigable for sea-going craft to Vancouver, Washington, just over 100 miles from the ocean, since 1821, and this reach has been deepened and maintained as demanded by the increase of shipping requirements. A deep channel for ocean-going vessels has also been maintained for many years in the short reach of the Willamette River from its confluence with the Columbia River to Portland. A project to provide a 27-foot ship channel in the Columbia River from Vancouver upstream to Bonneville dam and lock, and to The Dalles, is well advanced.

The Corps of Engineers is carrying forward channel improvements in the Columbia River from Celilo Falls, Oregon, to the mouth of the Snake River, and in the Snake River to Lewiston, Idaho. These projects, needed to keep pace with rapid growth of traffic, fit in with the plan for the progressive development of inland navigation of the Columbia and Snake rivers. Later steps will include the Umatilla Rapids dam on the Columbia and four dams on the lower Snake.

A project for the further development of inland navigation on the Willamette River has been adopted by the Congress. This will increase the channel depth to Albany and enlarge the locks around the falls at Oregon City, and will tend to meet needs of increasing traffic on the Willamette River.

Among projects for future consideration is the Washington State proposal for a Columbia River-Gray's Harbor-Puget Sound inland waterway. Construction of this major inland water link between Puget Sound, the Columbia River, and the interior would seem to depend primarily upon the further development of heavy industries in both areas and the need of low cost interchange of large volumes of bulk materials.

Continuing improvements are required for the maintenance of channels at various ports on deep water Puget Sound and also at various smaller coastal harbors. On Puget Sound, projects have been recommended for bettering the harbor conditions at the larger ports of Tacoma and Olympia. At Neah Bay, on the south side of the Strait of Juan de Fuca, the entrance to Puget Sound, construction of a breakwater for a harbor

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[28] An exception may grow out of the shift of the lumber industry to southern Oregon, which may require some expansion in logging and common carrier roads in that area.

[29] See reports of Corps of Engineers on Columbia, Willamette, and Snake rivers, and on north Pacific harbors; *Drainage Basin Committee Reports for Pacific Northwest Basins*, Pacific Northwest Drainage Basin Committee and Pacific Northwest Regional Planning Commission, 1937; *Columbia Basin Report*, Pacific Northwest Regional Planning Commission, Appendix S, "Transportation," F. R. Brown, 1935.

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Significant Federal River and Harbor Projects

AS SUBMITTED BY THE CORPS OF ENGINEERS, U. S. A.

Docket No.	Name and location	Amount necessary to complete	Status of plans:[1] remarks
	Bay center channel, Willapa Bay, Wash	$30,000	General plan for channel from Palix River to Bay Center dock.
302-115-2	Chehalis River, Wash	139,000	Complete plans for deepening of ship channel between Cosmopolis and Montesano.[2]
	Columbia River at Arlington, Oreg	38,500	General plans for entrance channel to terminal.
	Columbia River-Baker Bay, Wash	170,000	General plans for channel west of Sand Island.
	Columbia River at Camas, Wash	45,000	General plans for turning basin adjacent to terminal site.
	Columbia River at Kennewick, Wash	30,000	General plans for turning basin.
	Depoe Bay, Oreg	214,000	General design drawings for enlargement and deepening of boat basin.
	Lake Crockett-Puget Sound channel (Keystone Harbor), Wash.	223,000	General plans for boat basin and channel into dock.
	Olympia Harbor, Wash	88,000	General plans for entrance channel and turning basin.
	Port Gamble, Wash	20,000	General plans for enlargement of channel into harbor.[2]
	Snake River, Wash	30,000,000	General design drawings for four slackwater navigation dams and open channel improvements between mouth and Lewiston.
	Stillaguamish River, Wash	35,000	General plans for highwater channel through South Pass.
	Tacoma Harbor, Wash	240,000	General plans for dredging in Wapato Waterway.
302-112	Umatilla Dam, Columbia River, Oregon and Washington	52,500,000 (complete with navigation and power)	General design drawings available. One of 11 dams in comprehensive plan for multiple-purpose development of Columbia River. Will include power.
	Umpqua River, Oreg	55,000	Stub channel and turning basin at Gardiner.
302-113	Willamette Falls Locks and Willamette River, Oreg	5,100,000	New locks and channel improvements will provide dependable navigation up to Albany when the seven multiple-purpose headwater-storage dams are completed. Part of the comprehensive basin-wide plan of development. Complete drawings for the locks and general plans for the channel are available.[2]

[1] Recommended to Congress for authorization of construction when funds are available.
[2] Authorized by Congress for construction when funds are made available.

of refuge is scheduled to begin in the near future. Several smaller projects have been recommended for other harbors, including Stillaguamish River, Baker Bay, Lake Crockett, Willapa Harbor-Bay Center, Wash.; Umpqua River, Salmon River, and Depoe Bay, Oreg. Smaller improvements recommended for Columbia River ports include Arlington, Oreg., and Camas, Wash.

Some of the more significant projects from the standpoint of regional development are included in the accompanying list.

Aids to Navigation

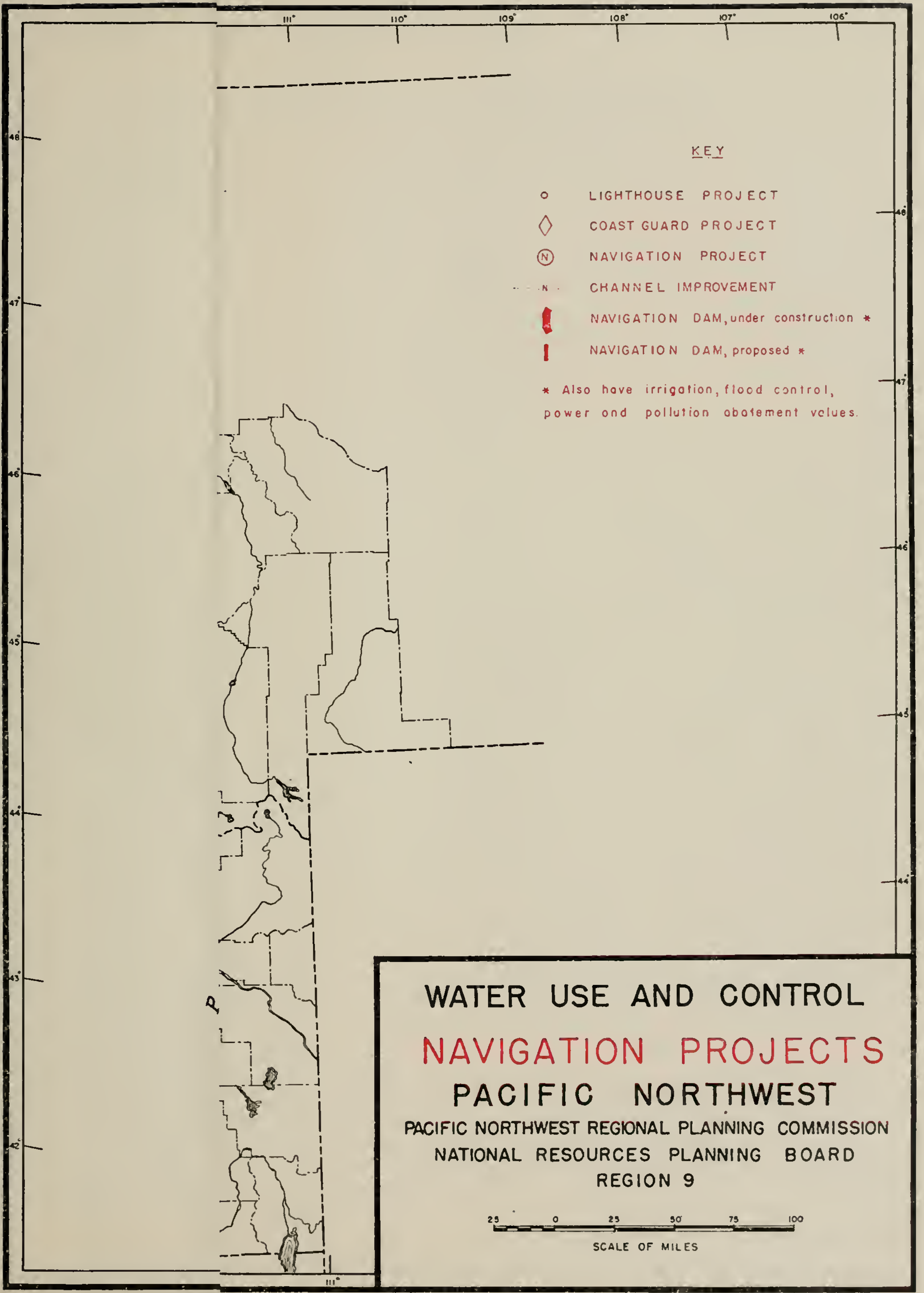
With the great preponderance of navigable waters of the Pacific Northwest in the western portions of the region, aids and assistance to navigation are principally required in Oregon and Washington. The increase in naval defense operations along the north Pacific coast and in Alaskan waters adds to the need of establishment of addditional aids to navigation and the repair and expansion of others. With the further improvement of inland waterway trunks and the accelerating growth of traffic thereon, there will be need of some expansion of programs for navigation aids in this direction. With the development of the 27-foot channel in the Columbia from the sea to The Dalles, of the 7-foot channel to Pasco, and of the 5-foot channel in the Snake to Lewiston, rather extensive revision of aids to navigation will be required. In this connection, inland Coast Guard base facilities at Vancouver, Wash., and a new tender will also be needed.

Because of the nature and the hazards of the north Pacific coast, many facilities for aid and assistance to navigation are required in this locality. Requirements include light stations, fog signals, beacons, buoys, radio stations and beacons, air stations, life boat stations, and communications facilities at strategic locations along the coastal and inland waters. Shore facilities for housing personnel, repair work, and administration activities are necessary adjuncts to the actual navigation aids.

Thirty United States Coast Guard projects of the character described are currently programmed; these range in estimated cost from about $5,000 to $250,000, with a total cost of about $1,700,000. The accompanying list includes some of the larger projects.

Airports and Airways

A great expansion of air transport has been experienced in the Pacific Northwest, as elsewhere, during the past decade. These services and facilities have become very important in the regional transportation scheme. At the present time the demands of national defense—involving the rapid transit of personnel and material—are emphasizing the need and stimulating the growth of air transportation. In some respects, however, normal expansion has been retarded, due partly to the military demands upon aircraft and upon personnel, materials, and facilities for their construction and operation. In the post-emergency period, with the lessening of these military demands, it is anticipated that there will be still stronger emphasis upon the further development of air transportation. Building capacity, construction and operating personnel will be available for renewed technical and economic advancement, reconstruction, and retraining in the air transportation industry. A considerable program of public,

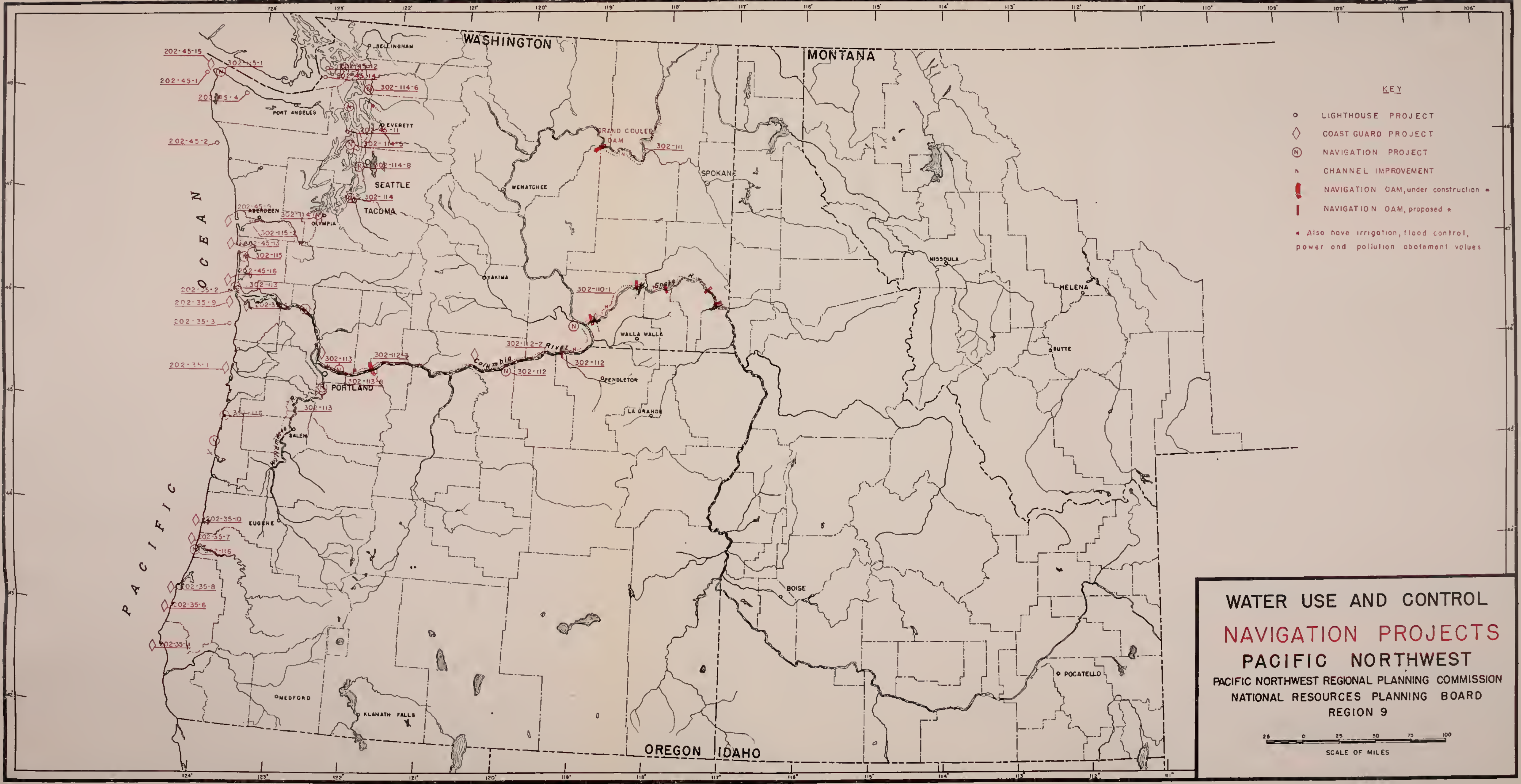


WATER USE AND CONTROL

NAVIGATION PROJECTS

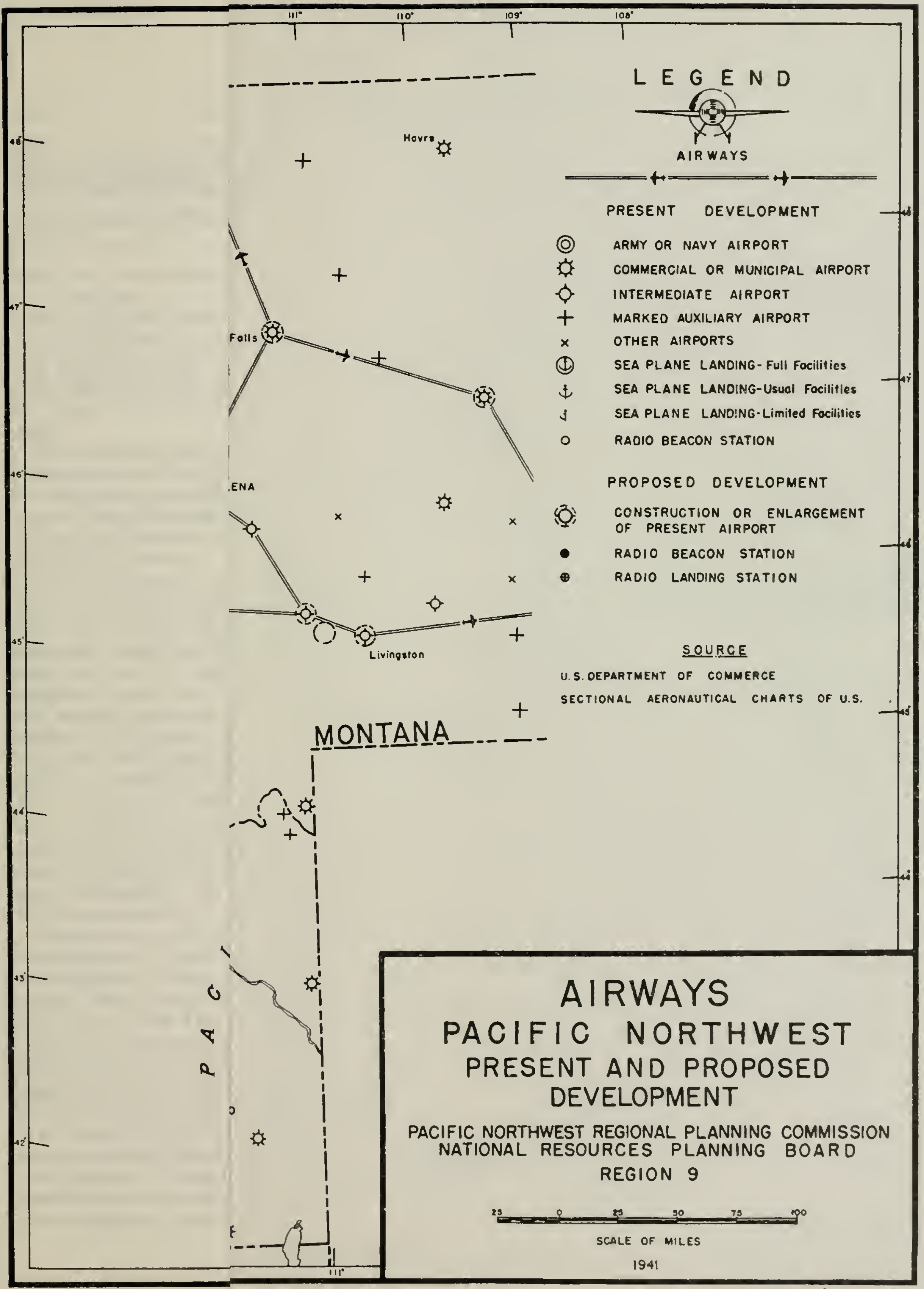
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9



WATER USE AND CONTROL
NAVIGATION PROJECTS
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

FIGURE 62

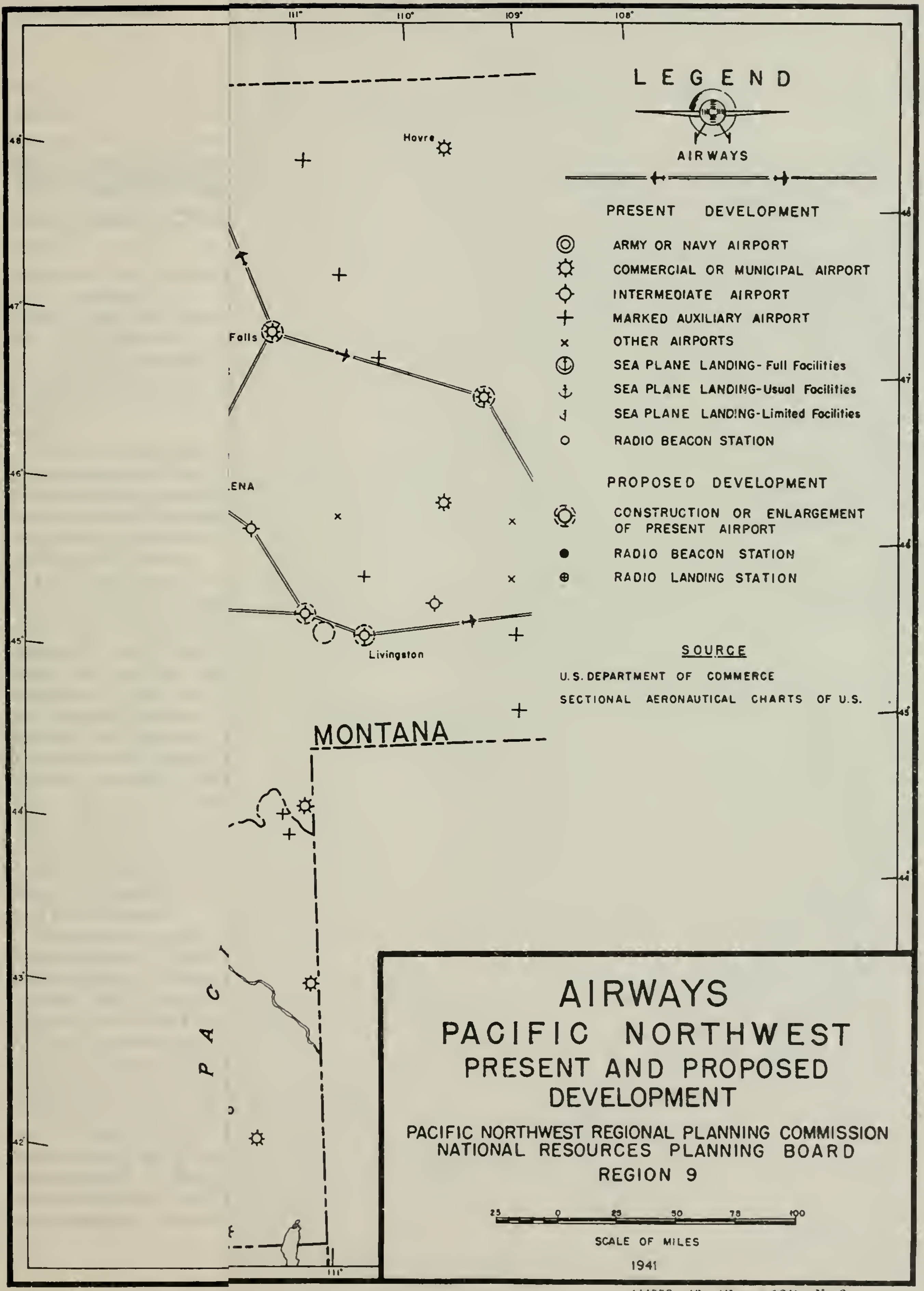


SOURCE
U.S. DEPARTMENT OF COMMERCE
SECTIONAL AERONAUTICAL CHARTS OF U.S.

AIRWAYS
PACIFIC NORTHWEST
PRESENT AND PROPOSED
DEVELOPMENT

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941



SOURCE

U.S. DEPARTMENT OF COMMERCE

SECTIONAL AERONAUTICAL CHARTS OF U.S.

AIRWAYS
PACIFIC NORTHWEST
PRESENT AND PROPOSED DEVELOPMENT

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

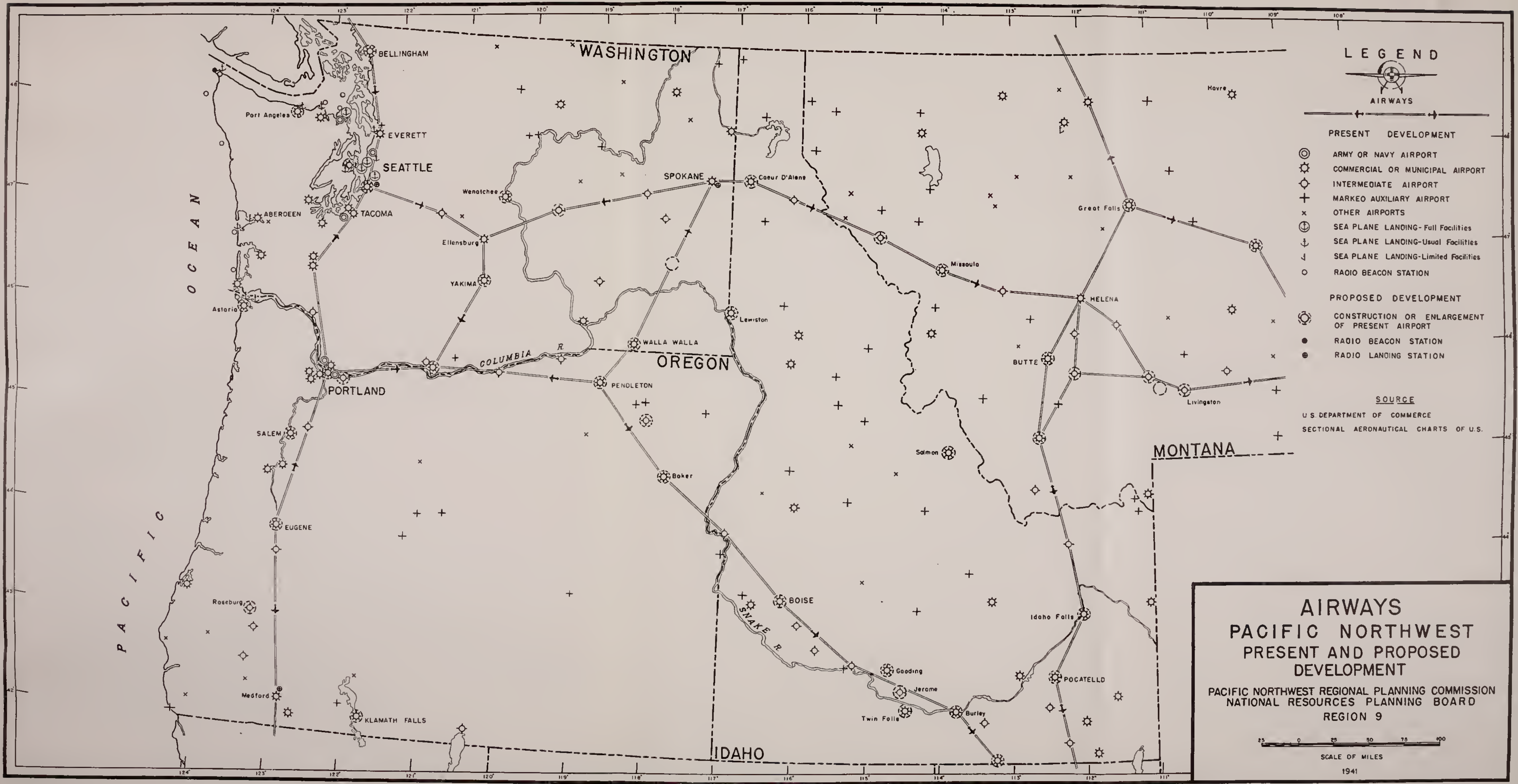

AIRWAYS
PACIFIC NORTHWEST
PRESENT AND PROPOSED
DEVELOPMENT
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
25 0 25 50 75 100
SCALE OF MILES
1941
LEGEND
AIRWAYS
PRESENT DEVELOPMENT
ARMY OR NAVY AIRPORT
COMMERCIAL OR MUNICIPAL AIRPORT
INTERMEDIATE AIRPORT
MARKED AUXILIARY AIRPORT
OTHER AIRPORTS
SEA PLANE LANDING-Full Facilities
SEA PLANE LANDING-Usual Facilities
SEA PLANE LANDING-Limited Facilities
RADIO BEACON STATION
PROPOSED DEVELOPMENT
CONSTRUCTION OR ENLARGEMENT OF PRESENT AIRPORT
RADIO BEACON STATION
RADIO LANDING STATION
SOURCE
U.S. DEPARTMENT OF COMMERCE
SECTIONAL AERONAUTICAL CHARTS OF U.S.
WASHINGTON
OREGON
IDAHO
MONTANA
PACIFIC OCEAN
COLUMBIA R.
SNAKE R.
BELLINGHAM
Port Angeles
EVERETT
SEATTLE
TACOMA
ABERDEEN
Astoria
Wenatchee
Ellensburg
YAKIMA
SPOKANE
Coeur D'Alene
Lewiston
WALLA WALLA
PENDLETON
PORTLAND
SALEM
EUGENE
Roseburg
Medford
KLAMATH FALLS
Baker
BOISE
Gooding
Jerome
Twin Falls
Burley
POCATELLO
Idaho Falls
Salmon
Missoula
HELENA
Great Falls
Havre
BUTTE
Livingston
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114° 113° 112° 111° 110° 109° 108°
49° 48° 47° 46° 45° 44° 43° 42°

FIGURE 63

Typical Federal Aid to Navigation Projects

AS SUBMITTED BY THE U. S. COAST GUARD

Docket No.	Name and location	Amount necessary to complete	Status of plans, remarks
202-35-1	Tillamook Bay lifeboat station, Oreg.	$147,320	Plans completed. Replacement of station dwellings, buildings, utilities, etc.
202-45-5	Seattle radio station, Wash.	209,000	Barracks and other buildings, land improvements, water and sewer systems, etc.
202-45-6	Port Angeles air station, Wash.	250,000	Officers' quarters, widen runway, and other improvements.
202-45-13	Willapa Bay lifeboat station, North Cove, Wash.	203,350	Sketch plans completed. Dwelling, boathouse, other buildings, towers, water supply, etc.
202-45-15	Baaddah Point lifeboat station, Neah Bay, Wash.	130,350	Plans not started. Dwelling, boathouse, launchway, officers' quarters.
202-45-17	Seattle depot wharf, Wash.	65,000	Wharf, depot grounds and roadway improvements.

quasi-public, and private improvements may be looked for in this field.

The future of air transportation in the Pacific Northwest may be affected by special geographic factors: the long distances between centers of population in the region, and the region's position with respect to northern routes—to British Columbia and Alaska and to Asia.

The Puget Sound area has become one of the greatest producing centers of air industry in the Nation. With the concurrent regional development of light-metal industries, it should be possible to continue, and to readjust to new needs, industrial activity in the aircraft field in the Pacific Northwest.

Air transportation in this region, as elsewhere, owes much to Federal support in various forms, including aids in provision of navigation facilities such as beacons, radio ranges, marker stations, traffic control systems, radio stations, radio landing systems, lighting equipment, as well as in such improvements of airports and landing fields as clearing and grading, runways, taxiways, and aprons. Many of these improvements have been accomplished with Federal support through facilities provided by the Work Projects Administration. This work has been applied mostly to local airports. The Civil Aeronautics Administration of the Department of Commerce has planned and launched an extensive program of airport development and installation of navigation aids designed to meet immediate and long-term needs.

The program currently available includes navigation improvements for such airways as Portland-Spokane, Seattle-Helena, Seattle-San Francisco, Seattle-Vancouver, Salt Lake-Pendleton-Portland, Pendleton-Spokane, and Salt Lake-Great Falls-Lethbridge; also various improvements, as outlined above, of various primary airports and intermediate landing fields at a large number of localities throughout the entire region. The visible program for the region at the present time is of the general order of $20.000,000. Other improvements, including highway flight strips and access roads, are proposed in programs still in formative stage. Need of other improvements is likely to grow out of the post-emergency shift of emphasis from military to general use of airport and airway facilities. The program is developing so rapidly under emergency conditions and the projects are so uniformly significant in regional development that a list of typical or significant projects is not included. The map, figure 63, serves as an index of location and distribution of proposed improvements.

Roads

Improvement of the region's road system—which now includes, in the four States, about 23,000 miles of pirmary and secondary State roads and well over 100,000 miles of country and forest roads—is a large and widespread factor in regional development and in employment stabilization. Potential programs are large, and the projects are well distributed geographically. Particularly where the planning of such improvements is closely aligned with land use and land development, their regenerative values will be large.

Many highway improvements—including new or improved roads, elimination of bottlenecks, and strengthening of structures—are immediately needed in defense areas to provide adequate access to and linkage of military and industrial establishments. The needs of national defense also call for initiation on a suitable scale of the long-run program for improvement of the strategic road net and for the construction of modern interregional and international highways for both military and civil purposes.

Large road programs and projects are potentially available for post-emergency reconstruction. Obviously, the emphasis will be shifted from the wide expansion of the highway net required during the past generation to modernization. Work can be done to great advantage in the region on links of interregional, national, and international highways; on city and metropolitan area arteries and belts; on farm-to-market and mine-to-market roads; on roadside control and limitation of access to and crossing of main trunk routes; on grade crossing elimination; and on urban parking projects.

The available program includes the 6-year programs of the State highway departments. Programs for emergency improvements in defense areas are now under development. Those for the larger post-emergency re-

Typical Federal Aid to Navigation Projects

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Current Road Programs

STATE PROJECTS

Docket No.	Name and location	Amount necessary to complete	Status of plans, remarks
	IDAHO		
	6-year program:		
	Primary road system	$20,271,400	Method of financing:
	Secondary road system	4,331,400	Federal funds $12,558,380
	Highway shelter improvements	22,500	State highway funds 12,066,920
		24,625,300	24,625,300
	Additional projects	35,911,000	
	Total, Idaho	60,536,300	
	MONTANA		
	6-year program:		
	Federal aid projects	27,490,000	Break-down of Montana program into primary and secondary road systems, etc., not available.
	Forest road projects	3,456,000	
	Federal land projects	507,000	
	Betterments	3,900,000	
	Surveys and plans	840,000	
	Rights-of-way	1,275,000	
	Maintenance buildings	210,000	
	State projects (additional)	24,000,000	
	Surveys (additional)	750,000	
	Rights-of-way (additional)	1,230,000	
	Total, Montana	63,658,000	
	OREGON		
	6-year program:		
	Federal projects	24,722,000	Break-down of Oregon program into primary and secondary systems, etc., not available.
	State projects	17,357,000	
	Forest-road projects	600,000	
	Minor betterments	1,800,000	
	Surveys	1,820,000	
	Rights-of-way	3,665,000	
	Laboratory building	25,000	
	Maintenance buildings	675,000	
	State projects (additional)	15,420,000	
	Surveys (additional)	600,000	
	Rights-of-way (additional)	1,320,000	
	Total, Oregon	68,004,000	
	WASHINGTON		
	Program not available.		

FEDERAL PROJECTS, AS SUBMITTED BY THE INDIAN SERVICE

Docket No.	Name and location	Amount necessary to complete	Status of plans, remarks
706–1–3	Road development, Blackfoot Indian Agency, Mont	$1,250,000	
706–9–3	Road development, Colville Indian Agency, Wash	1,500,000	
706–12–3	Road development, Crow Indian Agency, Mont	1,000,000	
706–16–3	Road development, Flathead Indian Agency, Mont	1,250,000	
706–18–2	Road developments, Fort Belkamp Indian Agency, Mont	550,000	
706–20–3	Road developments, Fort Hall Indian Agency, Idaho	550,000	
706–21–3	Road developments, Fort Peck Indian Agency, Mont	1,000,000	
706–23–1	Road developments, Grande Ronde Siletz Indian Agency, Oreg	250,000	
706–31–3	Road developments, Klamath Indian Agency, Oreg	1,000,000	
706–37–2	Road developments, North Idaho Indian Agency, Idaho	1,250,000	
706–49–2	Road developments, Rocky Boys Indian Agency, Mont	500,000	
706–66–1	Road developments, Taholah Indian Agency, Wash	400,000	
706–68–2	Road developments, Tongue River Indian Agency, Mont	275,000	
706–70–2	Road developments, Tulalip Indian Agency, Wash	250,000	
706–73–2	Road developments, Umatilla Indian Agency, Oreg	350,000	
706–76–3	Road developments, Warm Springs Indian Agency, Oreg	750,000	
706–80–3	Road developments, Yakima Indian Agency, Wash	1,750,000	

construction project await the crystallization of national policy and plans.

A number of governmental agencies are involved in the comprehensive program for further road development: the State highway departments in State and Federal aid systems financed from gasoline taxes and general Federal revenues; the Federal Roads Administration in national and international routes and state aids, and jointly with national forest and national park services in forest and park roads; the Bureau of Indian Affairs in Indian reservations; the counties and local road districts in local road development.

Illustrative of the scope of road work proposals are the programs briefly outlined in the accompanying table.

Governmental Plant

In this first regional program, public buildings projects and facilities for research, surveys and investigations, welfare and health, law enforcement, education, recreation, utilities services, and miscellaneous general facilities are grouped under the general heading of "government plant."

Such programs, of Federal, State and local governments, have a considerable aggregate value and a considerable geographic spread. The potential effects (upon employment stabilization) of properly programmed work of this character are considerable.

Improvements in these groups will provide many services essential to development of the region and to the advancement of security and living standards of its people. In a number of instances, these projects will have some important effects, directly or indirectly, in stimulating other regional development programs. They will be more economical and beneficial in regional, State and local development if they are carefully planned and programmed in relation to population changes and to land and community development. In many instances plans for such facilities will be highly dependent upon prospects for growth or decline, or lack of material change, in the area served. The planning of most such projects must be well integrated with plans for governmental organization and administration. For example, the Federal building plan for any important city must be based on the long-term needs of various branches of the Federal Government in the area served and should take into account the coordinate relationships of the various governmental agencies. It is also essential in all instances to integrate the plan of the government plant expansion—whether Federal, State or local—with the city or community plan.

The currently available lists include a number of Federal and State projects.[30] No comprehensive lists (other than those for defense community needs) are now available for the very extensive works programs needed at local levels of government. The nature of a government plant program and the kinds of projects included are illustrated by the general description under the several classifications below and by the significant projects listed in the table. It should be borne in mind that the total significance of programs of this kind will be greatly increased by the addition of local projects.

Public buildings (*general*).—The present Federal program includes primarily a number of post office building (one a large Federal office building), also some administrative facilities for individual agencies, including the Bonneville Power Administration. The post office list includes 13 buildings in Idaho, ranging in cost from $70,000 to $200,000; 20 in Montana, $85,000 to $150,000 each; 24 in Oregon, $75,000 to $190,000 each; and 32 in Washington, from $70,000 to $275,000. The larger project, to provide needed additional space for Federal offices in Portland, is listed in the table.

State projects include improvements and additions to State capitols at Boise, Helena, Salem, and Olympia.

Research facilities.—The present program includes only a few construction projects in this category—those of the bureaus of Agricultural Chemistry and Engineering, of Animal Industry, and of Dairy Industry. Because of the beneficial influences of research and experimentation on regional development, formulation of this part of a work program should have special attention.

Law enforcement facilities.—Projects in the present Federal program include extensions to the prison facilities at McNeil Island, Wash., and to border stations in Washington, Idaho, and Montana. State programs include rather extensive improvements to State prisons and other penal institutions.

Health facilities.—Items in the current Federal program include Public Health Service hospitals and improvements to veterans' hospitals. The State programs contemplate extensions and improvements to State general, tuberculosis, and insane hospitals and sanitaria.

Other welfare institutions.—State items available contemplate extensions and improvements to a number of institutions, including homes for the aged, for children, for soldiers; and schools for the blind and the deaf.

Educational institutions.—Each of the States has or is developing rather extensive programs for long-term extension and improvement of educational plant. These cover State universities, colleges, normal schools, and special institutions such as those for the blind and deaf, and the industrial or training schools. Consolidated programs for elementary and high school systems are not now available.

Housing

A comprehensive program for future housing is not yet available in the Pacific Northwest. Each of the States has enabling legislation for public housing projects, and communities in each State have formed local housing authorities. Public housing projects have been set up and are in various stages of organization, construction, or completion in several cities, including Seattle and Bremerton, Wash.; Twin Falls, Idaho; Butte, Helena, Great Falls and Billings, Mont.; and Oregon City, Oreg.

In defense areas (such as the Seattle, Everett, Tacoma, Bremerton, Portland, Pendleton, Hermiston, Spokane, and Boise districts), a number of public defense housing projects of various kinds—permanent and temporary, for military or civilian use—are being provided by various Federal agencies. In these, and other defense areas, private house building is being expanded under Federal mortgage and insurance plans. In a few cities, the local housing authority program is being expanded to meet defense needs.

Development of the defense housing program should be continued by defense communities with State and Federal cooperation, so that urgent needs may be met promptly and, with the minimum of conflict insofar as lasting community needs are concerned. In the meantime, plans and programs for meeting more general housing reconstruction needs should go forward, so that projects of this large and effective class will be available for the post-defense emergency period.

Although housing in the aggregate affords one of the

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[30] See current reports on State construction and improvement programs, Idaho, Montana, Oregon, and Washington (in preparation).

Government Plant—Significant or Typical Projects

AS SUBMITTED BY AGENCIES

PUBLIC BUILDINGS (GENERAL)

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
	FEDERAL		
	Bonneville Power Administration:		
711-45-13	Administration Bldg., North Vancouver, Wash	$500,000	
	Public Buildings Administration:		
1201-10-6	Post office, Moscow, Idaho	200,000	
1201-35-28	Post office, Portland, Oreg	3,500,000	New post office, custom house and Federal office building.
1201-35-29	Post office, Pendleton, Oreg	190,000	Extend and remodel post office and court house.
1201-45-1	Post office, Aberdeen, Wash	275,000	
1201-45-45	Post office, Vancouver, Wash	180,000	
1201-45-46	Post office, Broadway Station, Seattle, Wash	235,000	
	STATE		
	IDAHO		
	State Capitol, Boise, improvements and repairs	41,000	
	State office building, Boise	350,000	
	Historical museum, Boise	75,000	
	State library building and equipment	167,000	
	MONTANA		
	State Capitol, Helena, improvements and repairs	78,000	
	State library, Helena	250,000	
	OREGON		
	State office building, Salem	1,000,000	

RESEARCH FACILITIES

	FEDERAL		
	Bureau of Agricultural Chemistry and Engineering:		
801-45-1	Frozen pack laboratory, Seattle, Wash	$230,000	Draft plans completed.
801-45-2	Western Hemlock bark extract plant, Washington	250,000	Plans not started.
	Bureau of Mines, Electrodevelopment Laboratory	500,000	

LAW ENFORCEMENT FACILITIES

	FEDERAL		
	Bureau of Prisons:		
401-29-1	McNeil Island prison, additions and improvements	$920,000	Plans not started.
	STATE		
	IDAHO		
	State Penitentiary, Boise, improvements	325,500	
	Eagle Island Prison Ranch, improvements	74,200	
	MONTANA		
	State Prison, improvements	245,000	
	OREGON		
	State Penitentiary, improvements	418,000	

HEALTH FACILITIES

	FEDERAL		
	Indian Service:		
706-21- 2	Hospital and Quarters, Fort Peck, Mont	265,000	
706-65- 1	Completion Tacoma Sanitarium, Tacoma, Wash	895,000	
	Public Buildings Administration:		
1201-24-12	Public Health Service Bldg., Hamilton, Mont	215,000	
1201-45-35	Marine Hospital, Seattle, Wash	225,000	
	Veterans' Administration:		
	Additions and improvements, Washington, Oregon, and Idaho	800,000	
	STATE		
	IDAHO		
	State Hospital North, Orofino, Idaho, additions and improvements	413,000	
	State Hospital South, Blackfoot, Idaho, additions and improvements	396,000	
	MONTANA		
	State Hospital, additions and improvements	858,000	
	Tuberculosis Sanitarium, additions and improvements	493,000	
	OREGON		
	Psychiatric Hospital, Portland, additions and improvements	475,000	
	Eastern Oregon State Hospital, Pendleton, additions and improvements	272,000	
	Oregon State Hospital, Salem, additions and improvements	3,504,000	
	State Tuberculosis Hospital, Salem, additions and improvements	177,700	
	Eastern Oregon Tuberculosis Hospital, The Dalles, additions and improvements	173,000	
	WASHINGTON		
	Note: Washington program not available.		

Government plant—Significant or typical projects—Continued

OTHER WELFARE INSTITUTIONS

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
	STATE		
	MONTANA		
	Orphans' Home, additions and improvements	88,400	
	Soldiers' Home, additions and improvements	141,500	
	OREGON		
	Fairview Home, Salem, additions and improvements	315,500	

EDUCATIONAL INSTITUTIONS

Docket No.	Name and location	Amount necessary to complete	Status of plans; remarks
	FEDERAL		
	Bureau of Indian Affairs:		
	Indian Service School, additions and improvements	57,000	
	STATE		
	IDAHO		
	University of Idaho, Moscow, additions and improvements	1,957,600	
	University of Idaho, Southern Branch, Pocatello, additions and improvements	1,088,500	
	Albion State Normal School, additions and improvements	188,000	
	Lewiston State Normal School, additions and improvements	89,000	
	State Deaf and Blind School, Gooding, additions and improvements	293,000	
	State School and Colony, Nampa, additions and improvements	78,000	
	State Industrial School, St. Anthony, additions and improvements	311,125	
	MONTANA		
	University of Montana, Missoula, additions and improvements	1,705,500	
	State College, Bozeman, additions and improvements	1,653,000	
	School of Mines, Butte, additions and improvements	295,000	
	State Normal College, Dillon, additions and improvements	131,300	
	Eastern State Normal School, Billings, additions and improvements	315,000	
	Northern Montana College, Havre, additions and improvements	1,283,000	
	School for Deaf and Blind, Great Falls, additions and improvements	283,000	
	Industrial School for Boys, additions and improvements	55,000	
	Vocational School for Girls, additions and improvements	31,500	
	OREGON		
	University of Oregon, Eugene, additions and improvements	945,000	
	State College, Corvallis, additions and improvements	1,006,000	
	College of Education, Monmouth, additions and improvements	122,500	
	Southern Oregon College of Education, Ashland, dormitory	100,000	
	Eastern Oregon College of Education, La Grande, physical education building	25,000	
	University of Oregon Medical School, Portland, additions and improvements	200,000	
	State School for Blind, Salem, additions and improvements	272,000	
	State School for Deaf, Salem, additions and improvements	400,000	
	State Industrial Schools, additions and improvements	97,500	
	WASHINGTON		
	Note: Washington program not available.		

largest of all reserves of useful work, this is one of the most highly fragmented and the least comprehensively planned, organized, programmed, and coordinated of public improvement fields.

The need for housing improvement is great in various parts of the region in both urban and rural areas. Although slums of the Pacific Northwest are less highly concentrated, less obvious, and less spectacular than those in older sections of the country, they are nevertheless widely existent. And coexistent are the attendant excess economic, governmental, and general social costs of bad housing.

The greater than usual division of responsibility between public and private enterprise has added to the difficulties in the way of broad advanced planning and programming of housing. The keys to the desired planning and programming lie largely in local hands. It is up to the community—with appropriate State and Federal aids—to determine the extent and character of needs and the ways in which these needs can be met by private, public, and cooperative enterprise. The place of individual and private initiative is particularly large in the housing field. There is also a very significant low-income area which apparently can only be covered through public aid—repayable directly or indirectly through the stoppage of economic wastes. The intermediate field—especially significant in the rehabilitation of blighted areas or decadent neighborhoods—should not be overlooked; here private capital may meet with public aids in solving the problem, perhaps quite largely through public, mixed, or private nonprofit or limited dividend corporations.

Surveys and Investigations; Research

In addition to projects for the physical construction of public and private works, the less tangible surveys and investigations are vital to regional development. It must be recognized that many basic types of investigation—topographic and hydrologic surveys; land and soil surveys; studies of population, labor, transportation, traffic, and other factors; drainage basin studies; area analyses; studies of organization and finance; and others—are essential to the development and maintenance of comprehensive and realistic works programs. In order to make an improvements program effective in the stabilization of employment, it is also necessary that more detailed surveys be made of site and other conditions for selected projects and that plans for such projects be carried in advance to the point where construction can begin without delay at the proper time.

Inadequate surveys and investigations are limiting factors in more ways than one in any program of stabilization and development. Research is an essential part of the base for the all-important industrial activity as well as for governmental programs. Resource investigations, carried to the point of experimental and pilot production of useful materials, are important to reoriented and reactivated industry in the post-war period. Public and cooperative research is particularly important to regional enterprise and to small enterprise.

Systematic area analysis—carried out on a cooperative basis to cover the resource and employment factors involved and the best directions and means of readjustment and improvement—will provide the most rational and realistic factual basis for any plan and program of regional development and internal improvement.

Framework of a Regional Development Plan for the Pacific Northwest

TABULAR OUTLINE OF OBJECTIVES

1. *Land management—Land use stabilization, soil conservation:*
   - Retirement, uneconomic farming areas.
   - More economic farm units.
   - Improvement, land use practices and control.
   - Water conservation.
   - Soil conservation and refertilization.
   - Mineral fertilizer industry.

2. *Land development—Reclamation, settlement:*
   - Irrigation—Columbia Basin, Snake Basin, Willamette Valley, other valleys, small projects.
   - Land clearing—deforested areas, economic agricultural lands.
   - Drainage and diking.
   - Settlement programs and aids.
   - Range conservation and development, including water conservation.
   - Conservation, nonagricultural lands: forest, watershed, recreational, wildlife habitat, etc.

3. *Forest management—Sustained yield:*
   - Cooperative sustained yield units.
   - Forest protection, against fire, insects, disease.
   - Improved forest practices, aids, and controls.
   - Forest land rehabilitation.
   - Public acquisition program.
   - Tax adjustment.
   - Technological development, manufacturing, waste elimination, etc.

4. *Water development and management:*
   - Multiple purpose projects—Columbia and other drainages, large and small projects.
   - Headwater storage development.
   - Interstate and international agreements for water use and control.
   - Upstream improvements for soil conservation, watershed improvement, range conservation, irrigation, flood control.
   - Flood protection; flood plain zoning.
   - Pollution abatement.
   - Fish and wildlife conservation.

5. *Hydroelectric power development and management:*
   - Continued power installation in multi-purpose projects to meet development and defense needs.
   - Continued development of grid system.
   - Power-use research and experiment program.
   - Regional (corporate) power agency.
   - Coordination of facilities in transmission, interchange and distribution of energy.
   - Rural electrification.

6. *Mineral development and utilization:*
   - Accelerated long-term program of geological and mineral survey and investigation.
   - Intensive surveys directed toward mineral use in defense and essential industry.

60. *Mineral development and utilization*—Continued.
   - Aids and cooperation in development and utilization—exploration, research and experimentation, small industry, transportation.
   - Development of sources and stocks of strategic minerals.

7. *Industrial expansion and diversification; manufacturing:*
   - Improved management of essential resources.
   - Research and technological development.
   - Aids to capital investment.
   - Establishment of key basic industries—chemical, metallurgical, etc.
   - Establishment of new fabricating, processing, manufacturing industries.
   - Improved distribution.

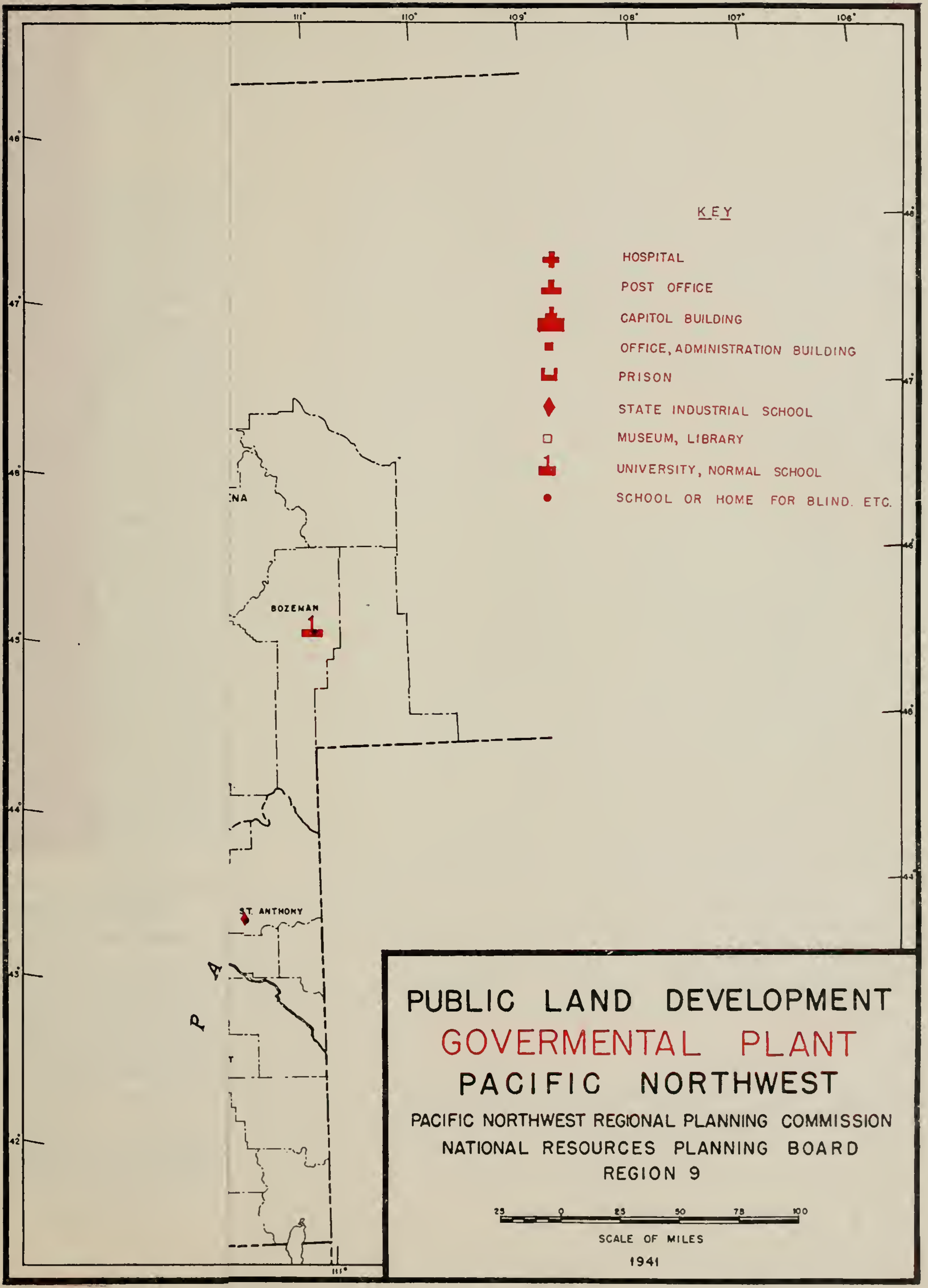
8. *Improved distribution and marketing:*
   - Market research and development—public, industrial, cooperative.
   - Further development of cooperatives.
   - Improvement of standards—processing, grading, packaging, etc.
   - Waste eliminations, industrial utilization of materials.
   - Distribution—research and improvement of facilities.

9. *Transportation development; coordinated transportation:*
   - Trunk waterway system improvement.
   - Rail consolidations.
   - Highway improvement—including limited ways for main routes; strategic links.
   - Airway and airport system improvement.
   - Integration of transportation lines, terminals, equipment, for effective operation.

10. *Social, economic, and technological betterment:*
   - Extended educational opportunities.
   - Community improvement and reconstruction.
   - Housing improvement.
   - Reconstruction, blighted urban and fringe areas.
   - Sanitary improvements.
   - Improved programs—Employment and employment stabilization, migratory labor, health, welfare, social security, education, planning.

11. *Cultural betterment; outdoor recreation:*
   - Educational system and curriculum improvement.
   - Regional study.
   - Community facilities and organization—for educational, discussion, arts, recreational activities, etc.
   - Protection of scenic assets. Development of recreational areas and facilities, parks, parkways, greenbelts, wildlife refuges, etc.

12. *Improvement of governmental machinery:*
   - Reorganization of system of school support.
   - Simplifications, consolidations.
   - Tax system simplification and improvement.
   - Improvements in administration and administrative techniques, including planning and coordination.
   - Planning, programming, budgeting, coordination, or public works and services—Federal-state-local, interdepartmental, etc.



PUBLIC LAND DEVELOPMENT
GOVERMENTAL PLANT
PACIFIC NORTHWEST

PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9

1941

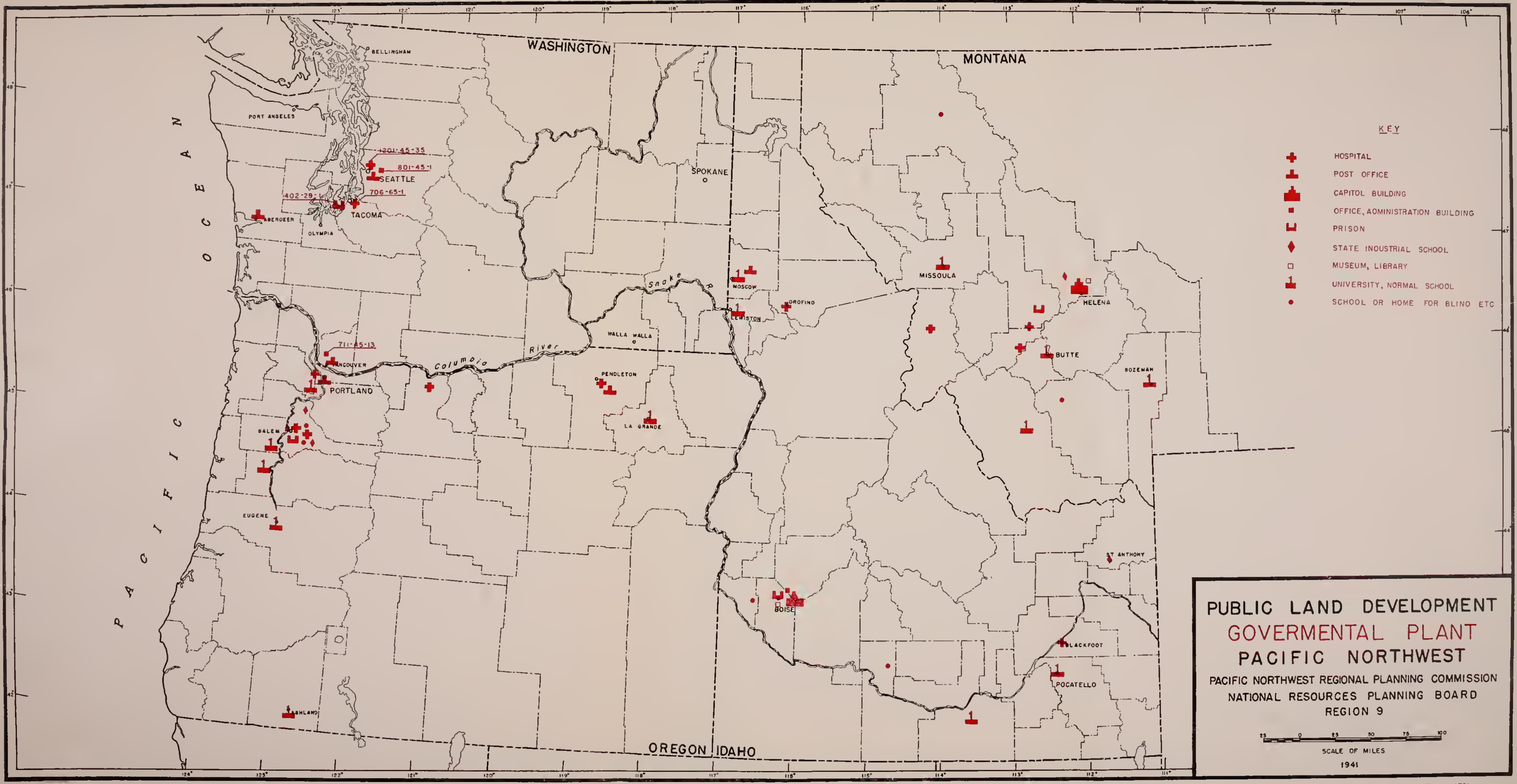

PUBLIC LAND DEVELOPMENT
GOVERMENTAL PLANT
PACIFIC NORTHWEST
PACIFIC NORTHWEST REGIONAL PLANNING COMMISSION
NATIONAL RESOURCES PLANNING BOARD
REGION 9
SCALE OF MILES
1941
KEY
HOSPITAL
POST OFFICE
CAPITOL BUILDING
OFFICE, ADMINISTRATION BUILDING
PRISON
STATE INDUSTRIAL SCHOOL
MUSEUM, LIBRARY
UNIVERSITY, NORMAL SCHOOL
SCHOOL OR HOME FOR BLIND ETC
WASHINGTON
MONTANA
OREGON
IDAHO
PACIFIC OCEAN
BELLINGHAM
PORT ANGELES
1201-45-35
801-45-1
SEATTLE
706-65-1
402-29
TACOMA
ABERDEEN
OLYMPIA
SPOKANE
MOSCOW
LEWISTON
OROFINO
MISSOULA
HELENA
BUTTE
BOZEMAN
WALLA WALLA
Snake R
Columbia River
711-45-13
VANCOUVER
PORTLAND
PENDLETON
LA GRANDE
SALEM
EUGENE
ASHLAND
BOISE
ST ANTHONY
BLACKFOOT
POCATELLO

Figure 64

PART IV

4. OBJECTIVES OF A PLAN AND PROGRAM OF IMPROVEMENT

Any regional plan and program of readjustment and internal improvement would be lacking in purpose, content, and vitality unless clearly defined general and specific objectives formed an integral part of the work. The formulation of some general objective or objectives should actually precede development of the plan; desirable modifications and amplifications of the aims should result from analyses of the conditions and needs and directions of readjustment and from the actual development of the plan and program itself.

Although the general objectives arrived at will be continuing ones, component aims must be raised or shifted from time to time, and contemplated rates of progress must be modified to suit the character or urgency of the needs of a particular period. Thus, in emergency times like these, it is necessary to add modifying objectives: first, with respect to the current defense aims and activities, and, second, with respect to the post-emergency period of readjustment and reconstruction. Many objectives are of such character that we may move toward them without sacrifice of immediate security; many are essential to real security. Progress toward long-term goals may be slackened when resources of men and materials are largely absorbed in meeting immediate needs or speeded up when these resources are again available. The broad aims, however, are little changed by emergency, at least as we have known it; they must remain to guide the thread of progress that must be maintained in any emergency and to aid, on the side of progress, in meeting the many situations where there are alternative ways ahead.

General Objectives of a Regional Development Plan and Program

The general objectives that follow, in the form of a twelve-point program, are those of the earlier report on the framework of a regional development plan[31] as modified on the basis of rather wide review, criticism, and discussion subsequent to their publication.

The central motive of action programs may be stated in a single phrase: the full use of human and physical resources to augment the welfare and security of the people, now and in the generations to come. Certain and orderly progress in an action program toward regional objectives is, of course, highly dependent upon the use of democratic processes in formulating the plan and upon subsequent understanding and support by the people it is designed to serve.

While the developmental activities are dispersed over a wide front and are entrusted to a great many agencies, it is possible to draw the whole program into focus and present it in a fairly simple statement. This may serve as a general guide and criterion for the consideration of specific program proposals, public, civic, and private, and supply a view of the general framework into which the various subsidiary programs should fit.

It should be emphasized that the 12-point program here outlined is not an artificial creation of the Regional Planning Commission or a planning staff. It is intended as a synthesis, in simplified form, of the aspirations of the region itself. It represents a concentration of official, technical, and citizen views gathered through a democratic process engendered by a continuous merging of departmental, State, and local plants. This has been fostered through a long series of large and small conferences attended by both laymen and technicians, by the meetings of regional and State planning agencies and their technical committees, and by a general pooling of insight and experience.

Each of the major points in the regional program is compressed into a single statement. Brief amplifications are given in the subsidiary notes. Although stated in broad terms, these objectives are intended to emphasize the more realistic and immediate aspects of future development that may be hoped for in the period of a decade or two.

The Major Objectives

1. Land Management

To stabilize agricultural land use and to preserve irreplaceable soil, the Pacific Northwest should carry forward a broad program for the improvement of land management.

(*a*) Retire from cultivation those areas in which soil depletion cannot be arrested by economically feasible changes in cultivation method and cropping system.

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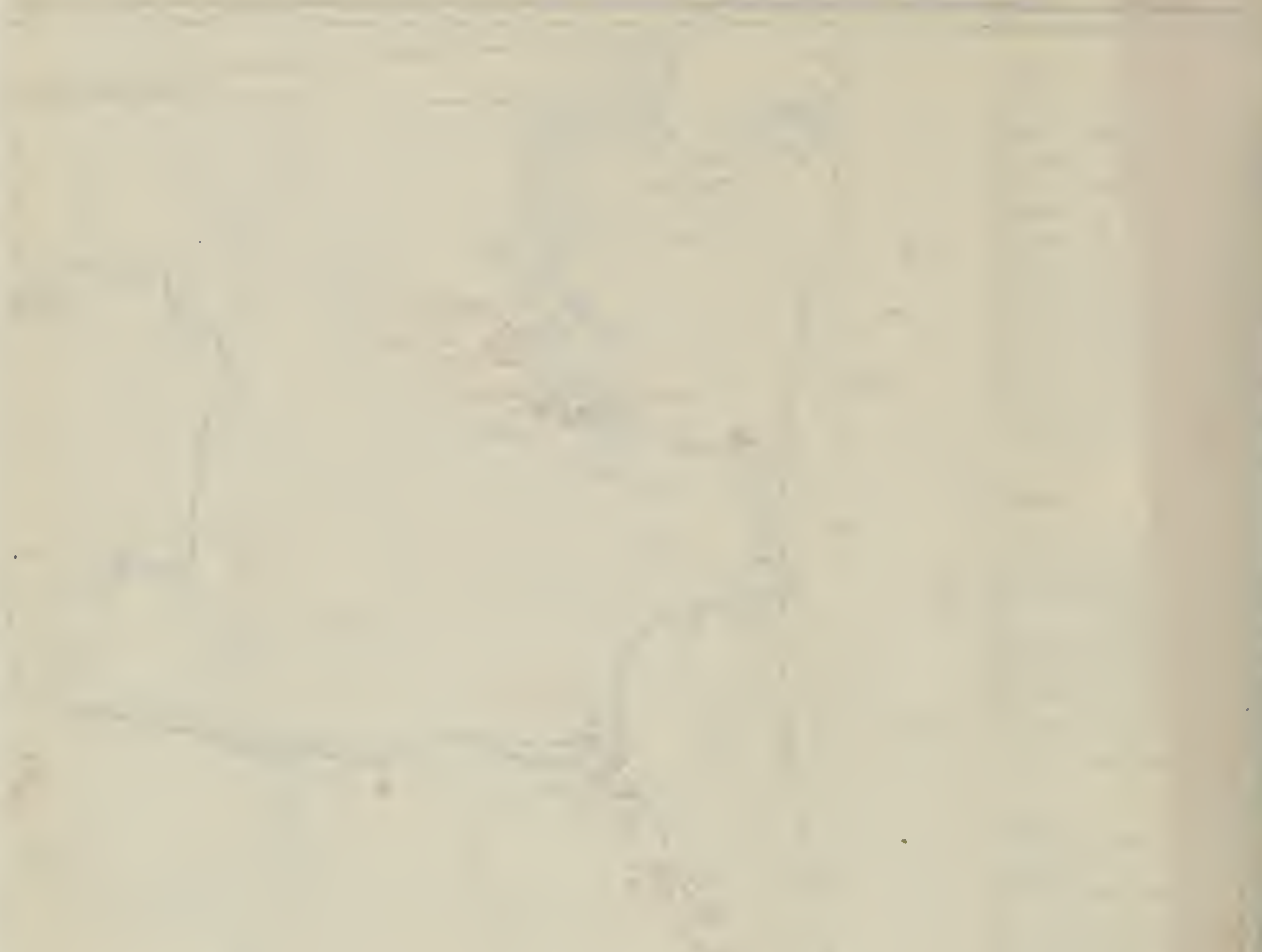
[31] *Preliminary Statement, Regional Development Plan for the Pacific Northwest*, Pacific Northwest Regional Planning Commission, 1940; *Development of Resources and Stabilization of Employment in the United States*, Part II, National Resources Planning Board, January 1941.



PART IV

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[31] *Preliminary Statement, Regional Development Plan for the Pacific Northwest*, Pacific Northwest Regional Planning Commission, 1940; *Development of Resources and Stabilization of Employment in the United States*, Part II, National Resources Planning Board, January 1941.

(*b*) Increase the size, in a number of areas, of farm operating units now too small to permit conservative use of the land.

(*c*) Make full use of soil conservation districts, grazing districts, rural land zoning, and other public and cooperative devices for improving land-use practice.

(*d*) Continue and expand soil conservation programs in order to maintain the productive power of good croplands now in use.

(*e*) Foster the establishment of a mineral fertilizer industry (phosphate, potash, etc.) adequate at least to supply these elements in quantities and at a price that will meet the need for maintaining the productivity of western croplands.

2. Land Development

To provide, within the decade, economically adequate settlement opportunities for at least 20,000 or 25,000 farm families and to permit agricultural production in the region to keep pace with other forms of development, the Pacific Northwest should reclaim by irrigation, clearing, drainage, diking, and flood control, at least one million acres of fertile croplands.

(*a*) The larger units in this program should be: The Columbia Basin area of Washington, the Snake River Basin area of Idaho, the Willamette Valley of Oregon, some of the cut-over area of western Washington and the intermountain valleys of central and western Montana and northern Idaho. Smaller projects for irrigation, clearing, and drainage of suitable land should be distributed throughout many parts of the region. Range improvement work should be applied in the grazing areas.

(*b*) To accomplish this there would be required a continuing systematic land inventory based on reliable soil and land classification surveys covering the most favorable areas. Public aids should be devised to promote and control land clearing and especially to insure that farm units so created shall be large enough to support a family at an acceptable standard of living. For the larger irrigation projects there should be in operation a settlement program which will assure the development of well-balanced modern communities designed to give the maximum economic and cultural opportunities at lowest feasible cost.

(*c*) Definite provision should be made, through suitable long-term financing, to accommodate a substantial number of farm families who have been forced off their lands elsewhere and who are now financially unable to acquire new footholds in the Pacific Northwest.

(*d*) In certain areas, like the Willamette Valley, where soil and climatic conditions are highly favorable, some additional settlement opportunities should be provided through a more intensive use of lands.

(*e*) In conjunction with this cropland development, there would be required a well-rounded program for the conservation of nonagricultural lands and full development of their multiple uses—forestry, watershed protection, recreation, and wildlife habitat.

3. Forest Management

To assure a permanent supply of timber for the region's wood-using industries and thereby to maintain the many communities economically dependent upon them, as well as to continue to supply a substantial part of the Nation's needs, there should be established a system of sustained-yield forest operating units embracing all, or at least a major part, of the commercial forest lands.

(*a*) Each unit should be established by appropriate agreements which would bind the cooperating private and public forest landowners to participate in a management arrangement that would finally assure a continuous supply of timber to the dependent mills, as well as continuing productivity of forest lands. Appropriate Federal and State legislation should be provided to induce private forest landowners either to participate in such management arrangements or to dispose of their lands to some authorized agency prepared to adhere to these agreements. Concurrent with the establishment of these sustained-yield operating units there should be substantial increases in Federal and State appropriations and programs for fire protection of privately owned forest land and for the control of destructive insects and tree diseases and for the rehabilitation of denuded areas. The ad valorem property tax should be modified and adjusted in ways that would encourage improved forest management.

Public acquisition, both Federal and State, should be extended to assist in setting up workable management units, to prevent untimely cutting of second-growth forests, and to take off the market timber now held in weak ownerships. Steps should also be taken to keep to the minimum the area of tax delinquent and abandoned lands that so often lie derelict for years. Research and experimentation should be further developed to aid in the solution of the technical problems involved in logging, silviculture, waste reduction, and forest economics.

4. WATER DEVELOPMENT AND MANAGEMENT

To provide water for all uses where and when it is most needed, the region should advance its construction program to provide fullest practicable control and use of stream flow in all the major drainage basins.

(*a*) The responsible agencies, including the the Corps of Engineers, the Department of Agriculture, the Bureau of Reclamation, and a permanent Columbia River power agency, should determine the locations and capacities of storages required for a more effective regulation of the Columbia River and its major tributaries. The necessary international and state agreements should be negotiated with terms agreeable to Canada and the upper basin States.

(*b*) The major elements of the Columbia, Willamette, and Snake basin projects should be completed, under way, or fully planned within 10 years. A program of smaller projects, widely distributed throughout the region, should also be well advanced. Supplemental water supplies should have been developed to meet the needs of irrigated areas now inadequately served.

(*c*) The upstream area of each drainage basin should be carefully surveyed and plans should be in operation to provide for the practicable maximum of flood control, run-off retardation and stabilization of soil and cover. In the lower sectors of each drainage, flood protection works and flood plain zoning should be developed wherever necessary.

(*d*) Pollution abatement measures should be in operation on the streams where waste and sewage disposal create a menace. Every practicable effort should be made to build up and conserve fish and wildlife resources.

(*e*) Techniques for drainage basin project planning, including the objective measurement of costs and benefits of multiple-purpose projects and the determination of priority ratings, should be perfected.

5. HYDROELECTRIC POWER DEVELOPMENT AND MANAGEMENT

To derive the greatest possible benefits from its hydroelectric power resources, the region should have in operation a comprehensive and fully integrated, high-capacity power system providing adequate interconnection of all principal generating plants and load centers.

(*a*) The physical means to accomplish this end lie in a well-balanced program of construction of multiple-purpose projects in which generator installations are kept safely ahead of the growing power demand, and in completing the essential framework of the Federal regional grid system of transmission lines. The grid system should be administered by a Federal corporate agency charged with full financial responsibility for making the enterprise stand on its own feet. The agency should have sufficient access, either directly or through the Federal Treasury, to the capital market to enable it to carry forward its construction and power market development program on the most orderly and economical basis. With regard to taxation, personnel selection, accounting procedure, and general financial responsibility, it should have a status similar to that of a private corporation organized to render this kind of economic service.

(*b*) The power agency, in collaboration with the appropriate technical services of the Federal Government and the States, should be operating a power utilization research laboratory equipped with the necessary engineering development (pilot plant) facilities. Research and demonstration should be recognized as one of the vital functions of its administrative responsibility.

(*c*) Rural electrification should be further extended into all areas where such service is at all feasible. Rates and rate policies should be designed to encourage the maximum use of electrical energy on farms.

(*d*) Insofar as technical improvements in power transmission shall have made them feasible, suitable arrangements for advantageous interregional interchanges of energy should also be worked out.

6. MINERAL DEVELOPMENT AND UTILIZATION

To derive greatest practicable social and economic benefit from the region's extensive mineral resources, and to enhance the national security, there should be carried forward an extensive program of investigation, development, and utilization in this field.

(*a*) This would involve an accelerated and more comprehensive long-term program of geological and mineral survey and investigation, by the Federal Government, the states and other cooperating agencies; also quick, intensive surveys and investigations, of extent, nature, and possible utilization of minerals, specifically directed toward their immediate use in national defense or essential industry.

(*b*) It also calls for a broad cooperative program of aid in mineral development and utilization, including exploration, research, and experimentation, capital for essential small mining operations; and transportation improvements necessary to development and marketing of essential minerals.

(c) Especial attention should be given to development of adequate sources of essential minerals, and to the creation and maintenance of suitable stocks of strategic minerals.

7. INDUSTRIAL EXPANSION AND DIVERSIFICATION

To attain greater economic security and more stable employment, the Pacific Northwest should expand and diversify its commodity-producing industry—especially that based on the manufacture of its raw material resources.

(a) This implies less direct economic dependence upon those activities which involve the extraction and liquidation of raw natural resources and more dependency upon the creation of wealth through application of labor, skill, and technological processes. The steps by which the region may attain this desired end are: (1) discovery and development of new technology related specifically to low-cost hydroelectric power, better use of low-grade and waste materials from forest and farm, more intensive manufacture of high grade forest and farm products, and to the mineral resources existing in the region or capable of being economically imported; and (2) the stimulation of the necessary capital investment in plant and equipment through a national program appropriately designed for such purpose.

(b) With the investigations of electrochemical and electrometallurgical processes, there should be an intensified exploration of the mineral deposits having greatest commercial promise. Practicable means for cooperation of public agencies and private interests in carrying on this work should be devised.

(c) With such a program in operation there should be established within 10 years a number of economically sound basic industries—metallurgical, chemical, chemurgical, food, etc. This should provide the basis for the growth of other new fabricating and processing industries, large and small. Through the influence of the strong power net and the favorable location of large key industries, there should be evidence of improving patterns of industrial distribution.

8. IMPROVED DISTRIBUTION AND MARKETING

To extend the markets for Pacific Northwest agricultural and industrial products, to reduce the unit cost of bringing products to markets and of marketing services, and to make marketing facilities available to the majority of producers, there should be established an improved and better organized system of marketing services and practices, trade connections, and distributing outlets.

(a) Some of the ways to accomplish these objectives would include: further development of cooperatives to serve in certain fields where this form of organization is adaptable; further pooling of trade promotion funds expended by independent producers; increased market reporting services by public trade information agencies; more rigorous standardization of products through improved grading and inspection; improved packaging; reduction of wastes and improvement of methods of processing, preservation, and handling of perishable products; improvements in distribution methods; removal of price-depressing influence of low-grade, cull, and waste materials, through increased industrial utilization of such materials in chemurgic and byproduct processes and outlets.

9. TRANSPORTATION DEVELOPMENT

To improve further the efficiency of the transport services and reduce transportation costs, there should be made effective a greater coordination of water, rail, highway, and air facilities.

(a) This calls for definite progress toward a coordinated system of transportation, in which the most efficient means and modes are developed and maintained—not in haphazard fashion with overlapping facilities and wasteful competition, but in an integrated pattern of complementary facilities in which water, rail, highway, and air transport each performs the services for which it is best adapted. Among means of progressing toward this objective are: (1) a correlation of the work of public agencies (planning, regulatory, and administrative), viewing the problem as a whole, determining essential conditions and needs, objective standards for measuring true costs of transportation by various modes, development and administrative plans, and other methods and means of procedure; (2) development and execution of a program to provide for the essential integration of lines, equipment, terminals, and interchange facilities—both public and private—as to design, construction, maintenance, operation, and management.

(b) In the Pacific Northwest, a modern regional trunk waterway system, parts of which are now completed, should be gradually improved and extended, within economically feasible limits, as one element in the multiple-use development of the rivers and in the coordinated transportation system of the region.

(*c*) Railroad consolidations and extended joint use of trackage should be accomplished wherever conditions warrant.

(*d*) Highway improvements, including the development of limited ways on some of the main routes, the improvement of certain routes to reduce effects of mountain barriers, and the completion of strategic links in primary and secondary nets, should be carried out.

(*e*) The intense stimulus now being provided to aviation through the national defense effort will doubtless result in a very rapid expansion of civil air transport. The Pacific Northwest should keep pace with this movement by planning and constructing an airport and airways system adequate to meet the requirements of safe and economic air transportation in this extended area.

10. SOCIAL AND ECONOMIC BETTERMENT

To aid in maintaining and improving standards of living and standards of labor efficiency, there should be in effect throughout the region comprehensive, continuing programs for social, economic, and technological betterment, in which the essential public and private efforts are well correlated.

(*a*) Included should be such measures as: Extension of educational opportunities adapted especially to meet the needs of inexperienced youth and of adults who have no special skills; development of improved housing and housing standards through private industry; encouragement of elimination of substandard housing, both urban and rural, by private and Government-aided enterprise, together with demolition and reconstruction of urban blighted areas suited to low-cost public housing projects; further development of the Federal-State system of social security to minimize the social and economic costs of unemployment, sickness, and old age; continued employment of able-bodied unemployed on socially constructive projects; development of governmental policy and programs which would induce stabilization of employment through better planning of production; further evolution of democratic planning processes looking toward social and economic advancement.

(*b*) Special efforts should be made to raise annual income and living standards of seasonal and migratory agricultural labor, through such measures as: cooperation of public agencies and private interests in providing decent and sanitary housing facilities at sites of seasonal work; improved facilities for medical service, especially immunization and child care; improved public employment agency procedures for accurately forecasting labor requirements and for keeping in constant touch with those seeking such work. In such ways, much needless wandering would be eliminated. In many localities, it should be possible to establish a "home base" for the worker's family, consisting of a small tract of land and a low-cost house, which the family might own or rent; insofar as practicable, these people should be aided and encouraged to use tracts for production of part of their own food supply. Educational and other community facilities should be made available to this now homeless group through such settlement programs.

11. CULTURAL BETTERMENT; RECREATION

To stimulate greater appreciation and creative effort in behalf of cultural values and to bring greater cultural, recreationol, and related benefits to the people of the region, there should be an expansion of public and private programs to foster those activities and institutions that may serve this end.

(*a*) The means for realizing these objectives lie very largely in further improvements and extensions of free public education, especially at the adult level. The fostering of community organizations for dramatic, literary, musical, and art productions is also an important means. Educational services of libraries, and of museums, should be improved and extended. Opportunities for training in a wide variety of handicrafts should be greatly extended and efforts should be made to develop original designs that express the qualities inherent in the region and its people.

School and college curricula and other educational programs should be so organized that they can accommodate materials and activities that relate to regional geography, conditions, problems, research, aims, plans, and accomplishments.

(*b*) Special attention should be given to the further development of outdoor recreation, to the preservation of the region's outstanding scenic assets in natural state, to the development of other valuable recreational areas in harmony with multiple-use principles, to the preservation of wildlife habitat, to the preservation of roadside forests and scenery, to the development of roadside parks and parkway systems, to the development of urban recreational and greenbelt areas, and to the problems of making these accessible both to visitor and resident at costs that are attractive even for people of modest means.

12. IMPROVEMENT OF GOVERNMENTAL MACHINERY

To reduce cost and to make services more effective and efficient the machinery of State and local Government should be modernized and simplified.

(*a*) Some of the major accomplishments that should be realized within a decade are: systematic reorganization of machinery and methods for school support that will make it possible to equalize educational opportunity and at the same time equitably to spread the burden of school costs; adaptation of all units of local Government to the use capabilities of the lands that each may embrace; adjustment of the property tax to make it conform to the long-term productive power of agricultural and forest lands; establishment of systems for the recruitment and selection of non-policy-making State and county employees on a merit basis; limited experimentation with the manager form of county government; some desirable consolidations of city and county government.

(*b*) Federal, State, and local Governments should make marked improvements in the machinery and techniques of administration, especially in procedures for planning, budgeting, financing, and coordinating projects and programs for resource conservation, for public aids and controls in economic development, and for public services and public works. With respect to planning, conservation, and development particularly, the techniques for intergovernmental coordination and for the cooperation of educational, business and civic groups should have reached a considerably higher stage of effectiveness.

Special Objectives and Post-War Programs

Improvement Program Objectives in the Defense Period

The basic objective during the war period is security—a dynamic and total defense, military, economic, and social, and the use of the regional resources to their fullest capacity for that purpose.

Beyond the directly military purposes of providing public works and improvements for the armed forces are almost equally important purposes in the provision of civil works. These are primarily: community facilities—housing, transport, utilities, sanitation, hospitals and clinics, schools, recreation, police and fire protection—necessitated by the military and industrial establishment and the attendant shifts of population.

In meeting these needs, secondary but very important aims should be recognized: to use to the maximum existing economic and social facilities; to provide for best practicable adjustment of the military establishment or industry and the community or area; to minimize potential dislocations in both war and post-war periods; to improve where practicable the patterns of distribution of industry and of population.

A final purpose in defense improvement planning should be to lay the groundwork for the post-emergency improvement work. If a program of readjustment and reconstruction is to be started without delays that will be costly from the standpoint of idle men and resources much of the preliminary work of investigation, survey, location, planning, and design for selected programs and projects, and of necessary governmental and economic organization, will have to be done in advance.

Objectives for a Post-War Program [32]

The underlying objective of an improvement program in the post-emergency period should continue to be security—still dynamic and still total, but with a shift of emphasis from the military to the economic and social aspects, including the stabilization of employment and industry.

Aims should emphasize:

Recognition and removal of various barriers to a timely and smooth transition from war to post-war economy.

Resumption of use of resources for economic and social advancement, and for a more rapid rate of progress toward regional objectives.

Conversion of a considerable portion of war industrial capacity to peacetime use; establishment of basic and linked industries and other improvements to facilitate economy and stability in such conversion.

Improvement and modernization of physical and economic resource bases for producing and service industries; basic provisions (resource development, utilities, distribution facilities, etc.) for improved distribution of industry in national, regional, and local patterns.

Rehabilitation and renewed effort toward conservation of the natural resources—land, soil, forests, water, and energy.

Acceleration of progress toward modernization and rationalization of communities; basic improvements looking toward better integration of towns, cities, and their metropolitan and service areas; improvements designed to raise living standards and reduce social and economic costs in communities.

Reorganization of civil and community facilities and works of the war program, looking toward effective conversion to peacetime use.

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[32] For National objectives, see *After Defense—What?* National Resources Planning Board, 1941, p. 7.

PART IV

5. FINDINGS AND RECOMMENDATIONS

Findings

Progress toward all these objectives will be very materially aided through a comprehensive plan and program for regional development and internal improvement.

Such a plan and program, presented in a preliminary and incomplete form herein, should be expanded and improved, and periodically revised.

The plan and program should comprehend a reserve of public works and services, as one of the major means of promoting full use of resources, employment stabilization, and regional progress.

The work program and reserve should encompass developmental public works and services planned at all levels of government; it should also envisage the more significant potential development projects of private or cooperative sponsorship.

Program and reserve should be built upon cooperative over-all area analyses designed to disclose most fundamental needs, as well as upon plans and programs of individual agencies.

Establishment of an effective program—with a reserve ready for use—calls for eight fundamental steps (as recommended by the National Resources Planning Board in its report on the Development of Resources and Stabilization of Employment in the United States):

(1) Continued efforts toward preparation and maintenance of *6-year programs or capital budgets* by Federal agencies, State Governments, local governments, and other agencies, public and private, anticipating a large volume of construction activity.

(2) *Development of alternative lists of projects* included in 6-year programs according to size of project, types and locations of skilled and unskilled labor involved, materials needed, rapidity of beginning, and flexibility of termination—all in relation to employment stabilization.

(3) *Immediate inauguration of surveys, investigations, and preparation of engineering plans and specifications for selected projects* through allocation of aids to Federal and non-Federal agencies from a revolving fund to be administered by the President through his Executive Office; and reimbursed to the revolving fund as part of the cost of construction of the project.

(4) *Advance authorization by the Congress of procedures* for grants, loans, guaranties of loans, leasing arrangements, or other devices for aids to State and local Governments for non-Federal projects for employment stabilization effective upon appropriation of funds by the Congress.

(5) *Advance authorization by the Congress of construction* of Federal projects in 6-year program of "A" priorities. Such authorization should be effective upon appropriation of funds by the Congress and not in itself involve any commitment for the immediate construction of the project.

(6) *Appropriation for advance purchase of sites* of projects by appropriate governmental agencies.

(7) *Development of method of financing public works* projects and studies of related problems of investment, taxation, and the Federal, State, and local shares of responsibility for costs of various types of public works and related activities.

(8) *Coordination of public works* construction at all levels of government, with other public policies which affect the level of business activity and employment, such as fiscal policy, social security policy, and policies of aid to private enterprise.

Planning and programming in the defense emergency calls for some modification of planning and programming procedure to accord greater emphasis to use of resources for defense, to defense facilities locations, to adjustment of community to such locations, and to provision of immediately needed community facilities.

Planning and programming in the post-defense period will call for reorientation with respect to use of resources, including added facilities, and for drawing on the work reserve as may be necessary or desirable.

Recommendations

The earlier parts of this regional study of the development of resources and of economic opportunity in the Pacific Northwest resulted in recommendations with respect to human, natural resource, and public works planning aspects of the general problem; also with special reference to land development and to foundations for a wider industrial development. Those recommendations are also pertinent to the advancement of a plan and program for the region.

With more specific reference to the regional plan and program just presented, the Regional Planning Commission recommends:

1. Approval, and adoption, by appropriate agencies of Federal, State, and local government, of the eight steps proposed by the National Re-

sources Planning Board for the effective formation and use of a reservoir of tested development projects.

2. Annual or biennial review and revision of the regional development plan and program—to look toward:

Successively more comprehensive and complete inventories of developmental projects, public and private, of regional significance;

Successively improved analyses of costs, responsibilities, financial resources and problems, budgeting, and relative priorities of projects;

Selection and development of projects essential to the total military and economic security of the Nation and region;

Selection and development of projects that will aid in development of the region and at the same time in the future shift from a predominantly armament economy to a predominantly peace economy.

3. A special plan and program for internal improvements in the Columbia Basin area of central Washington, based on the joint investigations for the Columbia Basin (Grand Coulee) irrigation project now in progress under the sponsorship of the Bureau of Reclamation, United States Department of the Interior.

4. Improved machinery for coordination of public work planning, programming, design and construction at the regional level.

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